ARGUMENTA OECONOMICA CRACOVIENSIA

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CONTENTS

Dear Readers,

The latest issue of *Argumenta Oeconomica Cracoviensia* confirms the broad range of subjects tackled in the journal, in which we publish articles from the fields of economics, management science, finance, and other sub-disciplines of economics. This broad profile creates publication opportunities for many authors working in these areas, which is reflected in the articles sent in to the editorial board.

It is our intention to publish both theoretical texts and work that engages with various aspects of current economic and social policy at the domestic and international levels.

The articles that appear in the journal are devoted to the workings of the modern economy and its various sectors. The authors analyse trends and changes in the market economy, examine the role of the state in regulating markets, advance hypotheses regarding forecasted events, and present overall assessments of the areas under consideration that include proposals for change.

Even a cursory examination of the history of economic theory informs us that a variety of currents and schools of thought have grown up within it. Generally speaking, research on the economy is now dominated by mainstream economics and heterodox economics. It should be stressed, however, that this division is to some extent arbitrary and that it is subject to change. Mainstream economics includes the neo-classical school, monetarism, the theory of rational expectations, real business cycle theory, and Keynesian economics, while the historical school, institutionalism, public choice theory, and the Austrian school are the most prominent currents belonging to heterodox economics. Given that confidence in mainstream economics has declined since the last financial crisis, there has been a noticeable return to neo-Keynesian ideas as well as to other schools of economic thought. The increasing diversity and complexity of social and economic phenomena fully justifies the need to study them using a variety of initial assumptions and analytical methodologies depending on the school of economic thought concerned. The weakness of mainstream economic

theories, especially those of the neo-classical school, in explaining the reasons for the financial crisis and the course it took has prompted renewed interest in methods of economic research that have been overshadowed by mainstream economics in recent decades. One expression of this is the increased interest in the Austrian school of economics and its modern variants. Andrzej Jędruchniewicz's article, "The Methodology of the Austrian School of Economics", may therefore be regarded as a useful and timely contribution.

Mieczysław Dobija addresses the question of the relationship between work and capital in an article entitled "Labourism and the Economics of Limited Taxes". The analyses are both abstract and, where based on selected empirical data for Poland and the USA, specific. The author reaches original conclusions regarding the sources of the creation of money and the financing of labour (remuneration), while reconceptualising the function of money and the functions of central banks. The author's view is that as a result of these changes, which are of fundamental importance to the modern economic system, we would be able to reduce taxes and eliminate budget deficits. Although the author's approach to fundamental economic categories and their interrelationships may be debatable, even controversial, it remains supremely original. It is an article which provokes us to critically re-examine the way the modern economy functions and to reappraise the paradigm of contemporary economic theories.

The functioning of a single economic and monetary area, specifically the euro area, which remains a gigantic social and economic experiment, has understandably attracted a great deal of scholarly attention. This research and analysis has addressed not just the economic grouping as a whole, but also the various segments of the single market and single currency. "The Impact of the Euro Area Macroeconomy on Global Commodity Prices", in which Monika Papież, Sławomir Śmiech, and Marek A. Dąbrowski investigate the relationships between real and financial processes in the global market and in the euro area, is a welcome and interesting addition to this body of work. The paper analyses energy and non-energy commodity prices globally and in euro area. The results the authors obtained by applying the structural VAR model constitute an important contribution to research on the functioning of the euro area.

The functioning of the euro area is also the subject of Anna Malinowska's article entitled "The Impact of the Monetary-fiscal Policy Mix and Financialisation on Fixed Asset Investment in the EU in 1999–2014", which attempts to explain how – under the qualitatively new conditions associated

with the financialisation of the economy – the autonomous monetary policy of the ECB is conducted in the context of state-level fiscal policies in the euro area. The period under investigation witnessed a tightening of monetary policy alongside high budget deficits and an increase in public debt. The hypothesis may be adopted that the lack of coordination between monetary and fiscal policy, which was in addition conducted under conditions of financialisation, restricted the capacity of enterprises in the real economy to acquire external capital and thereby limited their ability to take advantage of financial leverage. The author tests this hypothesis by investigating the influence of financial policy (monetary, fiscal) on investment in the real economy in the euro area. Although there is an abundant literature offering analysis and research findings on this subject, the results obtained in this paper make a valuable contribution to our understanding of the mechanisms by which the euro area functions.

The role of exchange-rate changes has been the subject of continuous investigation from the perspective of their influence on domestic economies and on the financial and economic standing of countries internationally. The phenomenon of radical changes in the value of a domestic currency in relation to foreign currencies represents an additional challenge for economists. It is then necessary to identify the causes of the situation and to understand and interpret the effects it will have on the economy and society. This is not a straightforward undertaking because exchange rates are influenced by many external and internal variables, which may be political or strictly economic in nature. It is in this context that the case of Ukraine, as investigated by Viktor Shevchuk in his paper "The Real and Nominal Effects of Large Devaluations in Ukraine", may prove instructive and interesting for readers.

While the other articles we have discussed address economic theory and the functioning of the economy, in the paper that concludes this issue of the journal, "The Understandability of Financial Statements in the Decision--making Processes of Insolvency Proceedings", Kinga Bauer alerts us to the importance of the quality of financial statements to economic entities threatened with bankruptcy and, where bankruptcy proceedings are already underway, to the creditors of the entity that is going bankrupt. The author conducted questionnaire studies of enterprises in the south of Poland that had entered bankruptcy proceedings as a result of insolvency. Although the number of enterprises in the sample was insufficient to make generalisations, the results nevertheless represent a useful contribution to our understanding of the role of reliable financial statements both for managers and for

other users of the information they contain, such as creditors. In that it is important for the overall functioning of the economy, the question of enterprise bankruptcy and insolvency proceedings is not confined to the microeconomic dimension alone, and therein lies the cognitive value of this paper.

Whilst commending the present issue to our readers, we would also like to invite contributions in the form of original texts, information about important academic events, and reviews of outstanding books. The journal appears biannually.

Prof. Stanisław Owsiak
Editor-in-chief

Andrzej Jędruchniewicz

THE METHODOLOGY OF THE AUSTRIAN SCHOOL OF ECONOMICS

Abstract

The aim of this paper is to discuss and evaluate the main problems in the research methodology of the Austrian school of economics. This methodology is considerably different from the mainstream approach. Representatives of the Austrian school claim that research methods cannot be transferred from the natural sciences to the economic sciences. They advocate, therefore, the application of praxeology. Research should be done by means of deductive reasoning, beginning with accepted axioms. The Austrians reject the use of mathematical formalism. Instead, they propose that research should be based on realistic assumptions, verbal logic, and cause-and-effect relationships. Furthermore, they reject precise, quantitative prediction in favour of general, qualitative prediction.

1. Introduction

As a result of the huge amount of empirical research conducted in contemporary economics, methodological questions have retreated into the background of most scholars' interests. They are, however, of key importance in applying the correct methods for discovering universal economic laws and forming a proper theory based on them. The majority of economists now employ a methodology derived from the mainstream schools, which is based on rigid principles that often lack formal precision and are too remote from economic reality. Econometric modelling in the form, for example, of structural models, VAR models, and Bayesian analysis, is the most important method of conducting research and presenting results.

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The Austrian school, which concentrates on employing deduction to create a logically cohesive theory of human action, offers alternative methods of economic research. The economists of the Austrian school use cause-and--effect relationships and verbal logic to try to discover the laws governing economic processes, which by their nature are complex and changing.

The chief objective of this theoretical contribution is to discuss and evaluate the major assumptions of the research methodology of the Austrian school of economics. Contained within a clear structure that will help to achieve this objective, the paper begins with an examination of the school's research paradigm before turning to the central elements of methodology: the differences between the economic and natural sciences, the role of education and empirical data, and the importance of prediction.

2. The Characteristics of the Austrian School

The Austrian school, which owes its present dynamism to its capacity to offer alternative explanations and solutions for economic problems (see Mises 2007; Rothbard 2007, 2008; Huerta de Soto 2010), does not belong to mainstream economics. It is believed to have been founded by Carl Menger, and to have originated when his *Principles of Economics* was published in 1871. It was this work, along with William Stanley Jevons' *The Theory of Political Economy*, also published in 1871, that marked the beginning of the subjectivist-marginal revolution.

The economists of the Austrian school, who include Menger, Böhm--Bawerk, Wieser, Mises, Hayek, Rothbard, Hazlitt, Machlup, Lachman, Salerno, Kirzner and Huerta de Soto, see the origins of their theory in the works of the fifteenth century and sixteenth century Spanish scholastics at the University of Salamanca, who included Francisco de Vitoria, Domingo de Soto, Juan de Medina and Luis de Molina. Influenced by the thought of St. Thomas Aquinas, they attempted to solve problems related to private property, price, monetary systems, percentages, work and remuneration (Schumpeter 1986; Chafuen 2007). Other works of importance to the Austrian school published before Menger include: *Essay on the Nature of Trade in General* (1755) by Richard Cantillon, *Value and Money* (1769) by Anne Robert Turgot, *A Treatise on Political Economy* (1803) by Jean Baptiste Say and *Economic Harmonies* (1848) by Frédéric Bastiat (Kwaśnicki 2000).

The main issue to consider when describing an economic school of thought is its definition of the subject. In the nineteenth century the definition followed Adam Smith's idea of economics as a science of nature

and a cause of the wealth of nations: "Political economy (…) proposes to enrich both the people and the sovereign" (Smith 2007, p. 7). However a growing understanding of the importance of subjectivist issues meant that this definition came to be regarded as excessively narrow. In the first half of the twentieth century Lionel Robbins, a representative of the Austrian school, offered a new definition of economics as: "(…) the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses" (Robbins 1932, p. 15). Though this definition, is accepted by economists from all schools, they interpret it in very different ways.

Austrian school economists stress that theirs is a science concerned with how people pursue their aims. An idea that Mises, for whom economics is "a science of human action. The basis of every human decision is choice" (Mises 2007, p. 3), applied assiduously. Austrian economists therefore give just as much prominence to the ends and motives of individuals as they do to means. Economics, which itself is part of the more general science of praxeology, studies the relationships between the choices we make in coordinating our goal-directed actions. Mainstream economists have interpreted Robbins' definition of economics as a theory of decision-making focused on the optimal allocations of resources to realise given objectives.

For economists of the Austrian school, economics is a purely positive science that does not seek to judge human actions as good or bad: "It is true that economics is a theoretical science and refrains from evaluating judgments. Its task is not to show people which goals they should pursue. It is a science studying which means should be used to meet certain goals, and not defining the goals to be set" (Mises 2007, p. 8). In sharp contrast to other strands of economic thought, the Austrian school thus refrains from advocating particular goals to be realised by economic policy.

Despite differences of emphasis and narrower and broader interpretations, the main features of the Austrian school are accepted by all of its representatives. It has received perhaps its clearest exposition in the work of Fritz Machlup (2004), who distinguishes six basic and two supplementary aspects:

1) Methodological individualism. In the explanation of economic phenomena we have to return to the action (or inaction) of individuals. Groups or "collectives" cannot act except through the actions of individual members.

2) Methodological subjectivism. In explaining economic phenomena we have to return to the judgments and choices made by individuals based on whatever knowledge they have, or believe to have, and whatever expectations

they entertain regarding external developments and – especially – the consequences of their own intended actions.

3) Tastes and preferences. Subjective valuations of goods and services determine the demand for them. This means that their prices are influenced by actual and potential consumers.

4) Opportunity costs. The costs incurred by economic actors and producers when making one decision means foregoing the benefits of another. If factors of production are employed for one purpose, other uses have to be sacrificed.

5) Marginalism. In all economic designs, the values, costs, revenues and productivity are determined by the significance of the last unit.

6) The time structure of production and consumption. Decisions reflect "time preferences" regarding consumption in the immediate, distant, or indefinite future, and investments are made in view of larger outputs expected to be obtained if more time-consuming production processes are undertaken.

The additional, typically "Misesian" elements include:

7) Consumer sovereignty. Consumers influence the effective demand for goods and services and, through the price signals which result in free competitive markets, the production plans of producers and investors. This is attainable only where governments do not interfere with the markets and place no restrictions on the freedom of sellers and buyers to follow their own judgment.

8) Political individualism. Only when individuals are given full economic freedom will it be possible to secure political and moral freedom. Restrictions on economic freedom sooner or later lead to an extension of the coercive activities of the state, which undermine and eventually destroy the essential individual liberties of capitalist societies.

If we analyse these features we can see that they are no longer only characteristic of the Austrian school (cf. Machaj 2013) and therefore cannot be treated as markers of difference from other schools. Mainstream economists also accept methodological individualism, methodological subjectivism, the influence of utility on demand and prices, marginalism and opportunity costs. Jesus Huerta de Soto (1998, p. 83) states: "Many authors believe that it would not be very difficult to incorporate it [the subjective nature of costs – AJ] into the mainstream neoclassical paradigm. However, the neoclassicals only include the subjective nature of costs rhetorically and, in the final analysis, although they mention the importance of the concept

of cost of opportunity, they always incorporate it into their models in an objectivized form".

Mateusz Machaj (2013) provides a more apt view of how contemporary Austrian school economics differs from the mainstream approach. He lists the six characteristics that in his considered opinion represent the most valuable features of the school: (1) the realistic synthesis of microeconomics and macroeconomics; (2) the theory of money and central banking; (3) the analysis of the socialist economy; (4) the role of economic calculation and the theory of entrepreneurship; (5) the heterogenisation of economic data; (6) the limitations of measurement and prediction in economics.

Though these are no doubt vital elements in any definition of the school, there are two important features that must be emphasised. The first is capital theory (Skousen 2007). For the Austrian school, capital is the market value of capital goods, which they stress are heterogeneous and stand, in the form of intermediate goods, at different degrees of remoteness from the goods that reach consumers. It follows that production also has a time structure that entails stages ordered according to the technological process of the manufacture and sale of the final good. This process uses both the primary production factors of work and land and the capital formed at each stage of production. Its structure, though, is ultimately the result of the decisions people make to consume or to save. The view that the production of consumer goods takes place over time and should always be considered in this context is starkly different from the theory of capital held by mainstream economics, which views it as a homogenous resource barely influenced by time. The second is the assertion that the market and competition involve the discovery and learning of dispersed knowledge. From the very beginning, the Austrian school economists saw the free market, and particularly the price mechanism, as the most effective way of coordinating human actions. Friedrich A. von Hayek (1988), who introduced a new perspective consistent with the individualist approach, claimed that because knowledge in society is dispersed and goals are individual, the market and competition are not the best vehicles for achieving our goals. The Austrian school does not regard knowledge as objective and available to all in equal measure, but as a subjective and practical quantity that we continuously generate and utilise in the course of our activities. Contrary to the ordoliberals, Hayek and his followers therefore believe that social systems should develop spontaneously (Pysz 2008). In this way new ideas and solutions must take account of individual expectations, and development cannot advance without the continuous discovery of the needs of recipients. The Austrian school

therefore rejects the assertion made by mainstream economics that the free market is afflicted by asymmetry of information. For Thomas DiLorenzo (2011, p. 250) "(…) asymmetric information is essentially another way of saying 'the division of labor', the whole basis of trade and exchange and the success of markets". DiLorenzo concludes the abstract of his paper with the contention that asymmetric information is a source of government failure, not market failure.

3. The Economic and Natural Sciences

Are research methods universal or should each area of study develop a unique approach? Karl Popper, who is generally regarded as one of the twentieth century's greatest philosophers of science, drew a distinction between a general and a specific approach. It was Popper's claim that research methods are identical for all disciplines at a general level, where they have four characteristic features: (1) the problem is identified; (2) the problem needs to be solved using some more or less abstract theory; (3) the theory is subjected to critical discussion in scientific circles; (4) critical discussion refines a theory and stimulates new developments. This is a methodology that permits us to identify new problems and new solutions (Popper 1997). The specific approach, meanwhile, introduces a distinction between the social sciences, including economics, and the natural sciences: "(…) the Newtonian method of explaining and predicting singular events by universal laws and initial conditions is hardly ever applicable in the theoretical social sciences. They operate by the method of constructing typical situations or conditions (…) the idea of a social situation is the fundamental category of the methodology of social sciences" (Popper 1997, p. 187).

Austrian school economists would fully endorse this view as, in general terms, would other schools of economic thought. The former, though, would differ where the specific point of view is concerned and argue that, because of its particularities and different subject matter, economics should not make direct use of the methods applied in the natural sciences – and especially not of those applied in physics (Hayek 1952; Nozick 1977). We are dealing here with methodological dualism, an approach that highlights the particular traits of economics as a social science rather than as a natural science.

That it is the science of human actions, of the choice of the means to realise certain ends, is the major difference between economics and the natural sciences, or even more broadly, between economics and the

mathematical and natural sciences. Economics studies the choices made by human beings with free will who, in pursuit of maximum utility, set themselves goals and seek the proper means by which they can be achieved (Eabrasu 2011). Men and women are thinking creatures in possession of subjective knowledge who, according to Mises and his followers, always act rationally. Though we may be creative actors in the world that surrounds us, we are not entirely free to act because of the physical, institutional or social forces that restrain and constrict us. However real they may be, though, these social forces are insufficient to nullify the purposeful action of people, which is the essence of economic research. How different this is from the natural sciences, in which the behaviour of the subject of study is very nearly always determined by external factors. Man does not have free will and is not oriented towards purposeful and creative activity (Blaug 1995). His position and behaviour can be described by means of functional and stochastic (probabilistic) dependency.

The subjects studied by economics and the natural sciences behave in different ways, which is what gives rise to the fundamental difference between them. This leads us to the problem of category measurement, on which the Austrian school laid a great deal of stress. While in the natural sciences data is precisely defined and can thus be measured objectively and completely, economics is confronted by the serious problems of the incompleteness of data and the subjectivity of human behaviour (White 1984; Kirzner 1992). These are important arguments in the assessment of research methods. We would be wise to take full notice of them and adopt a cautious stance to the uncritical transfer of economic methods to other sciences.

Austrian school economists have not been the only ones to point out the differences between economics and the natural sciences. Economics possesses the following characteristic features: (1) the phenomena studied are complex; (2) the sciences are not extensively applied; (3) the use of a common language; (4) incomplete objectivity (Stachak 1997). The last characteristic, which is particularly interesting, refers to the problem of the researcher's attitude: "In formulating certain claims he might follow an ideology, class solidarity, peer solidarity or his own interests. But with sufficient intellectual experience (criticism) and ethical research values there should be no errors in terms of lack of objectivity" (Stachak 1997, p. 40).

Jesus Huerta de Soto (2009) tackled the differences between economics and the natural sciences using the example of fractional-reserve banking, whereby banks cannot loan all of the money they have on deposit. Instead they hold reserves to protect them against the risk of all depositors

withdrawing their money at the same time. Banks assume that this risk can be quantified and employ the rule of large numbers to estimate the level of reserves they need to hold to protect themselves against it. According to De Soto, however, the risk cannot be reliably estimated because – unlike in the natural world – economic phenomena depend on human actions. The outcomes cannot be estimated with a specific probability because they are connected not with risk but with uncertainty. Table 1 sets out the idea of risk, which this approach applies to the natural sciences, and the idea of uncertainty which, as it is connected with the creative action of people, can be applied in economics.

Table 1. Risk (Natural Sciences) and Uncertainty (Economic Sciences)

Natural Sciences	Economic Sciences
1. Class probability: the behaviour of classes is known or can be known as opposed to the behaviour of individuals.	1. "Probability" of a unique case or event: there is no class, and even if some factors influencing unique events are known, others are not. An action itself may trigger or cause a certain event.
2. It is placed in the situation of risk insurance.	2. The creative nature of human activity results in uncertainty having a permanent character. Uncertainty cannot be insured.
3. Probability can be expressed in mathematical categories.	3. Probability cannot be expressed in mathematical categories.
4. Probability can be assessed by means of logic and empirical studies. Bayes' theorem allows class probability to be estimated as new information appears.	4. Probability can be discovered through intuition, understanding, and the estimates of entrepreneurs. Each new piece of information modifies anew the map of convictions and beliefs (the concept of surprise).
5. The concept of probability is the object of study of natural scientists.	5. Probability concepts are usually used by enterprises or historians.

Source: Huerta de Soto (2009, p. 293).

Frank H. Knight (1933), who drew a clear distinction between uncertainty and risk, is the reference point for mainstream economists in their analyses of these two factors. In Knight's view, the crucial point is whether or not it is possible to calculate the probability that an event will occur. Risk arises where events or the outcomes of behaviour are governed by a probability distribution and can be quantified, whereas uncertainty is present when we are faced with changes whose probability cannot be estimated.

Though economists of the Austrian school focus on the notion of uncertainty in management, they do not dismiss the problem of risk. Their approach is therefore nowhere near as radical as that of Huerta de Soto. The Austrian school understands risk in terms of the insurance a given entity arranges in case of an unfavourable event. This does not need to be accurately estimated; it is sufficient to allow for the possibility of the event occurring. The quantitative estimation of the probability of an event occurring is performed by insurance companies, who thereby increase the certainty of human actions and protect people against unforeseen and costly events. Risk, which occurs in the process of management but in essence is a characteristic of the sciences, therefore refers to random events whose probability is known in advance.

"The technical-economic reason it is impossible to insure uncertainty stems basically from the fact that human action itself brings about or creates the events which an attempt is made to insure" (Huerta de Soto 2009, pp. 293–94). Human actions do not take place in stable, solely external conditions. All individuals determine their goals subjectively and choose the appropriate means to secure them. The environment and the human factor mean that the uncertain nature of the future can never be completely eliminated. Building the future means creating a subjectively--determined reality by cooperating with other people, which requires us to apply information that is dispersed, individually interpreted and continually being created. Given the speed at which new information appears, then, people are highly likely to change their views and in some cases to change their views radically. They are thus forced to confront a series of unforeseen circumstances in rapid succession. It is for this reason that uncertainty cannot be expressed as a calculated and objective probability. Probability is calculated by firms: "(…) The conclusion to be drawn is that of the impossibility of talking about subjective probabilities that tend to objective probabilities. The dimensions are not on the same footing but cover different levels of knowledge" (Wubben 1995, p. 116). It is for these reasons that economic thought concerning human action refers to uncertainty, that is, to changes whose probability is unknown.

4. Deduction and Empiricism in Economics

The selection and assessment of the research methods applied in economics is a factor that distinguishes the Austrian school from mainstream schools that follow the traditional, neoclassical approach:

"The neoclassical paradigm is based on modelling, refers to positivism and empiricism and makes extensive use of mathematics, while the Austrian school applies a cause-and-effect approach, *a priori* deduction (clearly determining the correct, non-theoretical role of empirical data) and verbal logic" (Wiśniewski 2012, p. 1). Let us restate our question: should the discipline use only deduction to discover economic laws or should it use both induction and the statistical analysis of empirical data for this purpose?

The Austrian school is decidedly and unanimously in favour of deduction as the method for discovering the truth in economics. In this respect it has maintained the methodological tradition of Jean-Baptiste Say and William Nassau Senior (Rothbard 1995; Landreth & Colander 2012), who are both associated with the neoclassical school. In their view, the primary focus should be on developing the terminology and enhancing the logical contents of economic theories. Nassau, in particular, while giving less weight to empirical data, has stressed the importance of *a priori* theory-formation based on real theorems whose negation would lead to logical contradictions.

In 1883 Carl Menger entered into a famous dispute over methodology with Gustav von Schmoller, who was a representative of the Younger German Historical School. The points at issue were the nature of the discipline and the research methods to be used in it. Schmoller, who considered economics to be an idiographic discipline which should apply the method of induction, claimed that Menger was attempting to detach German economics from its English and French counterparts (Landreth & Colander 2012). If there were no objective economic laws, which was Schmoller's view, what possible purpose could be served by attempting to discover them? Economics was instead to focus on microscopic analysis of historical factors and on the empirical presentation of the state's contemporary economic achievements. Menger, for whom economics was a nomothetic science that should rest on deduction, rejected this approach utterly: the task of economists is to form logically coherent structures of thinking based *a priori* on simple and true formulations that best explain real processes. Such an approach fulfils the aim of the discipline, which is to understand the world as it is.

Rather than accept an approach involving either the detection of errors in economic research using experimental methods, where observation in isolation is possible, or their detection by historical methods, where any interpretation is possible, Mises elaborated a science of human action: "Praxeology – and consequently economics too – is a deductive system. It draws its strength from the starting point of its deductions, from the category of action" (Mises 2007, p. 58). In this way the formulation of economic

theory is based not on human experience, but on understanding the essence of human action and how to analyse it logically (Rothbard 2005). This basic knowledge is something all are born with and possess: "The fact that man does not have the creative power to imagine categories at variance with the fundamental logical relations and principles of causality and teleology enjoins upon us what may be called methodological apriorism" (Mises 2007, p. 30). The method proposed by Mises was accepted by the Austrian school and is still being used effectively. Though it requires substantial intellectual commitment to apply it deeply, the effort is rewarded by the positive effects it brings about. Reasoning in the categories of human action brings economic theory closer to reality (Eabrasu 2011) and renders it internally coherent and understandable as a consequence.

The debate between the Austrian and historical schools was in fact a rather brief affair. Though it was exacting for both sides, it was the former school that expended the greatest amount of time and energy opposing the mainstream view that economic laws are universal and objective. The role of empirical research in discovering laws and constructing economic theories is still being discussed today.

In the second half of the 20th century the debate within economics became dominated by advocates of the prime role played by empirical data (Caldwell 1994; Blaug 1995; Mayer 1996). More recently, though, two parallel approaches have come to prevail. In the first, economists refer to accepted axioms and employ deduction to formulate hypotheses which they then attempt to verify (less frequently falsify) with figures, while in the second they begin by analysing empirical data and proceed to establish relationships between economic categories (cf. Kuhn 1968; Lakatos 1970). Both methodological approaches have attracted the critical attention of the Austrian school.

The similarities between the Austrian approach and that of the mainstream schools go no further than the latter's acceptance of deducing hypotheses *a priori*. The Austrian school raises several objections to the foundations of the proposed hypotheses as well as to their empirical verification. The first involves the condition of the economy. In the mainstream schools (neoclassical economics; real business-cycle theory) economic processes are analysed as if they were in a state of general equilibrium. In this way all markets establish a price at which they clear and all entities have accomplished their aims. For the Austrians, who claim that the economy can never be in equilibrium because its natural state is dynamic rather than static, this Walrasian perspective detaches economic processes

from reality and evades the question of entrepreneurship. Entrepreneurship is the force coordinating human action and is the way in which a market economy strives for equilibrium (Kirzner 1992; Rothbard 1992). What is more, entrepreneurship uses and continuously creates information, which is thus never known or available at the beginning of the process. The Austrian approach is more convincing than the mainstream approach because it confronts this state of flux and seeks to comprehend it more deeply. To accept the equilibrium argument would mean focusing on the formal and mathematical analysis of what is in fact an economic fiction.

The second complaint concerns the methods used to analyse economic processes. The majority of the models the mainstream schools now use are based on mathematical formalism (cf. Hoover 2001; Jurek 2013; Czerwiński 2002), according to which models are rigid, strict and act as a "mechanical imitation of the economy" (Lucas 1980, p. 697). The mainstream schools are thus content to adopt the methods used in the natural sciences. The Austrian school, though, along with many others, rejects the application of mathematical models and methods in economics (Huerta de Soto 1998; Rothbard 1992) and raises the following objections: (1) individual utility, which is the basic category of human action, cannot be measured objectively; (2) a world peopled by creative and free people is by nature complex and changing, which means that there are no stable quantitative relations between categories in an economy; (3) models often ignore the problem of sequential processes in time: "In essence, there is an immanent and more or less disguised fiction at the heart of mathematical equilibrium theories. That is, they bind together non-simultaneous magnitudes operative in genetic-causal sequence in simultaneous equations as if these existed together at the same time. A state of affairs is synchronised in the 'static' approach, whereas in reality we are dealing with a process" (Mayer 1994, p. 20); (4) hypotheses that are either obvious or devoid of economic sense are often modelled, which suggests a lack of reflection on the part of mainstream economists; (5) the models cannot include all of the variables important to analysing a given economic problem; 6) there are no objective functions of a continuous nature in economics (Wiśniewski 2012; White 1984; Mayer 1996; Leszek 2013). The Austrian school advocates the use of verbal logic and cause-and-effect relationships in economic analyses rather than mathematical and functional methods. If adopted, they permit a more cautious and deeper investigation of the general laws governing complex economic processes.

The third objection concerns the realism of the assumptions made when studying economic reality (see Long 2006; Hardt 2012). The mainstream

schools, and the non-Keynesian ones in particular, construct models relying on the "as if" idea set out by Milton Friedman in *The Methodology of Positive Economics* (1953) which, in Hayek's view, is in many respects just as dangerous as Keynes' *The General Theory of Employment, Interest and Money* (1936). The "as if" idea allows mainstream economists to disregard unrealistic and illogical assumptions in their models and instead to focus on securing high predictive power, which might in any case simply be a matter of luck (Long 2006). This approach is unacceptable to the economists of the Austrian school, for whom the discipline's most important feature is to provide the world with: "(…) knowledge of the indirect, hidden consequences of the different forms of human action" (Rothbard 2008, p. 438). It is impossible to give an accurate account of reality based on unrealistic assumptions. While it is acceptable to simplify the world around us for the sake of model building, it is unacceptable to include in them elements that have little in common with reality and treat that as a platform for formal mathematical research (cf. McCloskey 1991).

The fourth objection concerns the empirical verification of hypotheses: "The fact that the 'observing' scientist cannot obtain the practical information which is being constantly created and discovered in a decentralized way by the 'observed' actors-entrepreneurs explains the theoretical impossibility of any time of empirical verification in economics" (Huerta de Soto 1998, p. 9). The complete rejection by some Austrians of the need for verification of their theorems would appear to be the most unconvincing of all the methodological postures adopted by this school. Austrian school economists believe that the use of data to test logically-deduced regularities is unnecessary and advance the following objections to deduction: (1) it is impossible to measure several categories; (2) measurement errors: "Rubbish in – rubbish out" (*Wywiad*… 2012); (3) aggregating data; (4) incorrect testing: "(…) this is explained by the fact that without such faulty procedures it would be much more difficult to prove hypotheses and thus lay claim to the role of explorers" (Mayer 1996, p. 187). While it is surely true that all researchers using data must bear these criticisms in mind, there is a significant advantage in testing hypotheses. Negative verification forces us to seek errors in deductive reasoning and to specify the reasons why the relationships under investigation have been disrupted. Positive verification, meanwhile, though not conclusive, offers further confirmation that our reasoning is correct. It is for this reason that some economists of the Austrian school have used empirical hypothesis testing in their work (Wainhouse 1982; Hughes 1997; Mulligan 2006; Fisher 2013). It is necessary

when testing hypotheses – which do not have to be in econometric form – to remain alert to the hazard of drawing simple conclusions and making unambiguous interpretations. Precise, statistically proven statements can be especially misleading to those without expert economic knowledge. The subject of our studies should always be referred to the logic of human action and viewed from the perspective of the economic system as a whole.

The second approach to the discovery of economic laws, which is to begin by analysing empirical data, is methodologically incorrect according to the Austrian school: "(…) Since any given set of data is highly likely to be compatible with many mutually exclusive hypotheses, we need a cohesive theory in order to separate the wheat from the chaff and choose the version that is most reasonable. Without such a theory the scientist will face interpretation error unable to answer the question of, for example, whether the USA emerged from the Great Depression thanks to the New Deal or in spite of it, or whether the operation of central banking mitigated, intensified (or even caused) the business cycles that took place in the 20th century" (Wiśniewski 2012, pp. 5–6). In the absence of any solid theory, the analysis and interpretation of data is tantamount to making random and accidental statements. Much as in the maxim "If you torture the data long enough, it will confess" (Coase 1982, p. 27), we are then free to use numbers to attempt to prove any relationship or make any evaluation.

5. The Role of Predictions

As economics is expected to offer precise forecasts of changes in time and quantity to its professional protagonists, prediction has a primary role in the discipline. Indeed, predicting changes is the main, if not the only, purpose of economics for many mainstream economists, public institutions, commercial banks and other enterprises.

Though Austrian school economists assert that it is impossible to make precise quantitative predictions about the economy, mainstream economists have not been prevented from using econometric models to do just that. For the Austrians, though, quantitative models are contrary to the logic of human action and hence inconsistent with the real course taken by economic processes (White 1984; Hoppe 1995). Models ignore the lack of stable quantitative tendencies in the economy and omit numerous important variables. What is more, they disregard the temporal structure of many processes and are based on data that may not be fully reliable. If its models are prone to such fundamental errors, how can economics be expected to

yield precise predictions for specific categories and entire processes? We should be persuaded by these arguments and agree with the Austrian school that it is impossible to make detailed predictions about economic matters, which are the result of people's creativity, subjectivity and ever-changing decisions. For quantitative prediction to make sense, people would have to be robots working under stable conditions. The insistence of mainstream economists that the discipline can yield precise predictions is an attempt to prove that economics has a capacity that, by definition, it does not in fact possess (see Phillips 2007).

Where prediction is concerned the Austrians also draw attention to the problem of information: "The events of tomorrow cannot be scientifically known today, since they depend mainly on knowledge and information which have not yet been entrepreneurially generated and cannot yet be known" (Huerta de Soto 1998, p. 9). Predicting the value to be achieved by a certain category always concerns a definition of time: in three months, in a year or in five years. This means that predictions made at a given time must omit all information and changes that will have taken place between the moment of prediction and the moment it relates to. For example, precise and quantitative predictions as to what will happen in an economy one year from now omit the influence of the information created during the year in which the prediction is made. It is therefore no surprise if the quality of the prediction suffers. Events may occur in the course of a year that will radically change our evaluations. It is therefore ineffective to improve models or to build new, more mathematically advanced ones. The problem lies not in the calculation technique, but in faulty methodology that ignores the changing nature of social and economic processes and phenomena: "(…) This failure of economists to guide policy more successfully is closely connected with their propensity to imitate as closely as possible the procedures of the brilliantly successful physical sciences" (Hayek 1978, p. 23). If they wish to approach their profession seriously, economists predicting the economic future should remember the case of Irving Fisher who, several days prior to the stock market crash of 1929, ventured the following prognosis in the New York Times: "Stock prices have reached what looks like a permanently high plateau (…) I expect to see the stock market a good deal higher than it is today within a few months".

Austrian school economists do not claim that economics is incapable of making predictions. They do think, however, that predicting the future of economic and social issues is exclusively a qualitative issue. Relying on deduction, axioms and realistic assumptions, they thus create logically

coherent theories that serve to interpret reality. So it is that instead of making perfectly precise predictions, the Austrian school takes account of the changing and complex world to produce fairly general forecasts that highlight certain tendencies. As Machaj wryly observed: "The predictions of any economist can be summed up with the words: 'Tomorrow it will rain, unless it doesn't', or 'the value of these assets will fall, unless they rise'. In fact, economics is in some respects a set of tautological theses concerning the operation of economic reality. Applying them to precise prediction leads to uncertainty" (Machaj 2008). Their adoption of realistic assumptions means that the Austrian school is able to make predictions that – imprecise as they are – describe the future more appropriately than those of the mainstream schools whose predictions are based on formalism and mechanical economics.

Why did precise predictions become so popular? There are two major reasons. The first was the desire of companies to predict the future more accurately so that they could increase the efficiency and profitability of their businesses. The second was the impetus to increased interventionism provided by the theories of Keynes. If governments wish to have an accurate idea of the results of their policies, they need to predict how business cycles change. However, since it is impossible to obtain specific predictions, new problems tend to arise. Under these sorts of conditions economists become social engineers whose task is to put state economic policy into effect. This issue has been aptly summarised by the Nobel laureate: "The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design." (Hayek 1988, p. 76).

6. Conclusion

The methodology applied by the Austrian school in its economic research methods is markedly different from that of the mainstream schools. The Austrians state unanimously that, since their subjects of study are so different, it is impossible for economics to adopt the research methods of the natural sciences. Economics is concerned with human action, that is, the choice of means to meet subjective ends. It is for this reason that praxeology offers the best foundation for our studies. According to the Austrian school, any attempts at discovering universal laws should be made by deductive reasoning and derive from accepted axioms. Emphasising the creativity of human action and the complexity and changing nature of the economic world, the Austrian school rejects the application of mathematical formalism.

Instead it advocates for research based on realistic assumptions, verbal logic, and cause-and-effect relationships, while renouncing quantitative and precise predictions in favour of general and qualitative ones.

The challenges Austrian school economists face today include nihilism and methodological pluralism. Prompted by their failure to explain and predict economic changes, mainstream economists have responded to continued criticism from the Austrian school by attempting to incorporate all methodological approaches into their armoury and acknowledge all as correct. All that is required is simply to select the best method to analyse a given economic problem. Such an approach is an anathema to the Austrian school, whose methodology stresses the primacy of economic theory over empirical analysis and enables human action to be studied under real conditions. This is the key to its greater richness and superior productivity. Attempts to combine the two research approaches are viewed by the Austrian school as the mainstream's way of defending its own paradigm.

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Abstract

Metodologia austriackiej szkoły ekonomii

Celem opracowania jest omówienie i ocena głównych zagadnień metodologii badań austriackiej szkoły ekonomii. Jej metodologia znacząco różni się od podejścia szkół głównego nurtu. Przedstawiciele szkoły austriackiej twierdzą, że nie można przenosić sposobów badań z nauk przyrodniczych do ekonomicznych. Proponują używanie prakseologii. Badania powinny być prowadzone za pomocą rozumowania dedukcyjnego, wychodząc od przyjętych aksjomatów. Austriacy odrzucają stosowanie formalizmu matematycznego. Zamiast tego proponują, aby badania oprzeć na realistycznych założeniach, logice werbalnej oraz zależnościach przyczynowo-skutkowych. Wyrzekają się również ilościowego, precyzyjnego prognozowania na rzecz przewidywania ogólnego i jakościowego.

Słowa kluczowe: szkoła austriacka, metodologia, dedukcja, analiza empiryczna, prognozowanie.

Mieczysław Dobija

LABOURISM AND THE ECONOMICS OF LIMITED TAXES

Abstract

The author shows that the system of fundamental economic concepts has so far not been clearly explained. Understanding capital and labour as primary and complementary economic categories leads to the view that money is also an abstract category which arises in the process of labour as work receivables. This means that work does not need to be financed because it finances itself, that is to say, it creates money. Recognition of this state of affairs implies the need for a new institutional solution. The natural solution would be to empower the central bank to pay compensation for work in the public sector and to control the labour productivity ratio. This macroeconomic ratio limits wages in the economy. The bank's present function of issuing money would be completely eliminated; it is a function which has no scientific justification. The author's calculations show that in such a system the budget deficit would disappear and the introduction of reforms to streamline and lower taxes would be possible.

Keywords: capital, labour, money, value, taxes.
JEL Classification: B11, E5, E58.

1. Introduction

The word labourism can be found in various dictionaries. One English dictionary defines it as a political theory favouring the dominance of labour in the economic and political life of a country. The dictionary of Catholic social teaching, meanwhile, describes the concept as an order elaborated in an economic model, which assumes that work is neither subject to capital nor its equivalent. This means that capital is subordinated to work, and not vice versa, as has been the case under a variety of socialist and capitalist socio-economic regimes. Yet no satisfactory concept of labourism has yet

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been elaborated – even in an outline form that could be put into effect under different social systems and in different countries.

The above explanations characterise to some extent the term labourism, but both include a metaphor about subordination and excess. Taking a strictly scientific approach and using scientific formulations, this study seeks to develop a coherent theory of the economy as driven by labour – labourism in short – anchored to consistently defined categories. Labourism is derived from the word "labour". As we know, work is a fundamental category of research in both the physical and economic sciences. This premise suggests that a theory of the economy driven by labour might be consistent with an understanding of the natural sciences as a means to create the knowledge needed to understand and control phenomena.

Once we have grasped that capital is abstract, and thus cannot be perceived via the senses, new avenues of economic thinking are opened. Because capital is the abstract capacity to do work, capital and labour can be conceived of as being in tandem. The disclosure of the relationships between capital and labour has led to a coherent economic theory (Dobija 2015a), in which work is a factor driving the economy. In an economy driven by labour, work and capital form a tandem of complementary concepts. The fundaments of this new economic thinking, including a description of the economic constant of potential growth, have been set out elsewhere (Dobija 2007, pp. 89–114; Dobija 2008, pp. 5–20; Dobija & Kurek 2013, pp. 293– 304; Kurek & Dobija 2013, pp. 16–24). There are many ways in which the theory of labourism differs from that of monetarism. Chief among them is the concept of money. According to the precepts of labourism, money is created by labour and the central bank performs the role of the payer of compensation for work accomplished in the public sector. Furthermore, the equation of exchange is quite original. The focus of this paper, however, is taxation. To what extent do economies need to tax? What should and should not be taxed? What can replace the proceeds of taxation? What approaches can we take to budget deficits? These are the questions that have prompted the lively discussion that follows.

The study also offers a modern clarification of the capital – labour – value – money tetrad, which represents the fundaments of economic thinking. Though each of these economic categories has already been discussed in the papers referenced above, it is hoped that the account of the tetrad presented here will disclose some new and significant relationships. The paper then proceeds to examine how the economy would work were it run according to the precepts of labourism. The great financial benefits that could potentially

flow from this new arrangement, which should render some proportion of taxation unnecessary, are explained. With the theoretical sections behind us, we then turn to taxation and a discussion of the theory of a fair minimum wage, which does not admit depreciation of the employee's human capital and so ought not to be taxed.

2. The Tetrad: Capital – Labour – Value – Money

The earliest appearance of the notion of capital was as the core category of double-entry accounting theory, whose main task, as we know, is the periodical measurement of the change in the initial capital invested in a business. An increase in capital over a given period, which is the most frequently expected outcome, is called income (profit). Money is the most requested of the various types of assets, while capital (one's own or a debt) and assets are expressed on a balance sheet as a statement of a company's financial position. The implication of this fundamental statement is that capital is an abstract category that cannot be perceived by the senses and can only be comprehended through intellectual exertion involving the mind. The relationships between the resources of capital, assets, value and money are examined precisely in the papers I have referenced (Dobija & Kurek 2013). As this will offer the clearest explanation of the relationships between the resources that make up the tetrad, I have decided to quote some sections of my earlier papers verbatim.

The first printed book that includes an explanation of the relationship between capital and assets, as well as a description of a system of periodical measurement of the capital invested in a business, was written by Luca Pacioli and was published in Venice in 1494. Accounting, which was dealt with in a section called *Particularis de Computis et Scripturis* [About accounts and other writings], was one of five topics covered. We may thus infer that the measurement of the growth of capital in business activities had begun its transition from an uncommon to a common skill by the end of the fifteenth century. The essence of this technique, which is now known as the two-dimensional double-entry accounting system, continues to be probed and discussed by scholars such as Y. Ijiri (1993, pp. 265–85) and M. Dobija (2009, pp. 5–20).

To show the relationship between capital and assets, let us take the very straightforward example of a business whose assets consist of a car worth USD 40,000 and cash on hand of USD 10,000. Table 1 presents this company's balance sheet.

Table 1. Statement of Financial Position

Assets		Capital	
Cash	USD 10,000	Owner's capital	USD 50,000
Car	USD 40,000		
Total	USD 50,000	Total	USD 50,000

Source: author's own example.

The assets represented by the car and the cash have a specific ability to perform work. By definition, moreover, they ensure a stream of inflows which, even though the value of cars diminishes, means that the total value of the business can be expected to be greater after a period of time has passed. This is the essence of assets. The *sine qua non* of a firm is to increase the value of capital. It will not survive otherwise. The main task of an accounting system is to measure periodical changes of capital, which will be expressed as income when capital increases and as a loss when it decreases. However, the unit of measurement in this system has not yet been clearly understood. It is after all a unit of capital, which is a notion that has been vague for centuries. We may state in summary that the value of assets is equal to the value of the capital embodied in them.

To grasp the idea behind the unit of capital we have to observe the way in which capital and labour operate in tandem, which is directly implied by the definition of capital. If capital is the capacity to do work it is also the potential to do work, which is exemplified by a car in a garage. The labour process, on the other hand, transfers this potential of accumulated capital to that which is worked upon. In this way labour is the dynamic aspect of potential capital. No labour can be performed without the prior accumulation of capital. Labour therefore also determines the unit measure of capital, which is hence measured in units of labour. Adam Smith (1776, Book I, Ch. V) was right when he wrote:

What is bought with money or with goods is purchased by labour, as much as what we acquire by the toil of our own body. That money or those goods indeed save us this toil. They contain the value of a certain quantity of labour which we exchange for what is supposed at the time to contain the value of an equal quantity.

Assets are measurable only because capital is embodied in them. The level of concentrated capital determines the value of the assets. Value, whether determined by free market exchange or computed by cost accounting, is the most important economic measure. Both play a significant role in the economy where they are known as exchange value and cost value.

The third basic notion we should consider is that of resources which, though it is the most uncertain of the three concepts under investigation, remains a terminological necessity in economic language. The concept of resources can be explained by distinguishing them from assets. While the essential feature of assets is that we know how much capital they possess, resources are vague and we do not know how much capital they possess. Though resources can be highly desirable, it is not clear whether they are able to produce income in existing economic reality, which is why we count them in natural units as tons or cubic metres.

It is hard to explain why this understanding of these significant categories was not adopted as orthodox economic thinking long ago. By definition, capital is closely related to work and value. If work is measurable it ensures that capital and assets can also be measured. Money is a work receivable, that is to say, it constitutes an absolute right to obtain the equivalent value. Given that Luca Pacioli published his book containing the abstract category of capital and the fundamental double--entry equation as long ago as 1494, it is difficult to understand why these difficulties have persisted for so long. The purpose of this accounting system was and remains the periodic measurement of increases in the initial capital invested in economic processes, that is, the measurement of income. What is more, it was not long before the use of double-entry accounting, which has been praised by historians of economics (Rosenberg & Birdzell 1994, pp. 345–56) for its positive contribution to the development of capitalism, became the norm. The duality of assets and capital is the intrinsic feature of double-entry accounting.

The long history of research into the abstract concept of capital shows how difficult it has been to understand. R. M. Solow (1963, pp. 7–9), for example, wrote of capital that: "(…) if the issue remains a matter of theoretical discussion and is still unresolved after 80 years, the suspicion arises that either the questions have been badly posed or the matter is very deep indeed". We may also recall Bliss, Cohen and Harcourt's three volume work *Capital Theory* (2005) which contains 71 scientific articles, letters from the nineteenth, twentieth and twenty-first centuries and introductions giving their own perspectives on the theory of capital by Bliss, and by Cohen and Harcourt. The differences of opinion were so great that the authors were simply given free rein to formulate their opinion on the infamously contentious subject of capital. Bliss (1975, p. 7) even wrote:

When economists reach agreement on the theory of capital they will shortly reach agreement on everything. Happily, for those who enjoy a diversity of views

and beliefs, there is very little danger of this outcome. Indeed, there is at present not even agreement as to what the subject is about.

The car mentioned in Table 1 can be perceived as firm, concrete and tangible; these are the characteristics of assets. The capital embodied in this car, however, is abstract and lies in its capacity to be driven and thus to do work. We may state in general terms that capital is the capacity to do work. When a car can no longer be driven it retains only scrap value. When a company is no longer able to perform its work of generating profits it goes bankrupt. When a person no longer has the ability to perform any work it means that they are dead. Capital is therefore the most important economic category, and economics is the study of capital, profits and sharing.

If we give the matter thought we may conclude that capital is an abstract, homogeneous and potential category. If this is so, no distinctions are introduced by the capital contained in the car, the cash on hand and in human resources. Two of the fundamental principles of capital (Dobija 2007, pp. 89–114) are that it cannot be created and that it relies on spontaneous random dispersion involving a thermodynamic understanding of reality. While capital and assets are measurable categories, resources are countable only in natural units. The content of capital in assets determines its value. As the potential ability to perform work, it determines the nature of the work as the transfer of capital to products. Potential capital and dynamic labour are thus in tandem.

Once it is understood that capital represents an abstract ability to do work, we may formulate a model of the changes required within capital so that it can be accommodated within the fundamental principles of thermodynamics, which P. Atkins (2007, pp. 3–78) defines as the determinants of the development of the reality that drives the universe. Capital too, we may note, is subject to these general principles. There is a principle of diminishing potential in operation. In this way money kept in the form of banknotes loses its purchasing power, the value of a car falls every year and, after twenty years in use, a bathroom requires thorough renovation. On the other hand, capital cannot be created out of nothing: to do work, the capacity to do a job must exist, which is the province of human capital. We must have initial capital before we are able to open a deposit account in a bank and earn interest on it. Likewise, as the case of an accomplished surgeon shows, a high degree of human and intellectual capacity must first be invested if we wish to make a high salary. Useful things have never been created from nothing. On the contrary, they are the result of work in the form of transfers of capital.

The compound interest formula with a specific interest rate structure offers a simplified model of changes in initial capital (Dobija 2011a, pp. 142–152; Dobija & Kurek 2013, pp. 293–304). This formula determines the growth of start-up capital (C_0) as a function of time elapsed (t) and the interest rate (r). It has two variations: periodic capitalisation [$C_t = C_0(1 + r)^t$] and continuous capitalisation [$C_t = C_0 e^{rt}$]. Given our current state of knowledge we may identify three factors affecting initial capital:

$$C_t = C_0 e^{rt} = C_0 e^{(p - s + m)t} \text{ and } E(s) = p = 0.08 \text{ [1/year]}, \qquad (1a)$$

where: p – is an economic constant of potential growth (ECPG); s – indicates the rate of random, spontaneous diffusion of capital and m – determines the increase in capital supplied by work. The factors affecting the growth rate of capital can be interpreted as follows:

p^{et} – this factor determines the natural potential of capital growth in line with ECPG = p = 0.08 [1/year];

e^{-st} – a random factor determining the spontaneous diffusion of capital (the impact of the thermodynamic arrow of time); t – flow of time;

e^{mt} – indicates and enhances growth, which occurs thanks to transfers of capital via labour accomplished by the capital embodied in employees and assets.

Though this does not constitute a final explanation of the structure of the rate of growth, our identification of the factors is justified by knowledge of the fundamental laws. Two opposing influences on initial capital may be considered: the declining diffusion (–s) of initial capital and the increasing concentration of capital through work transfers. The constant p then becomes an argument in a labour function. Then:

$$C_t = C_0 e^{rt} = C_0 e^{[m(p) - s]t} \text{ and } E(s) = p = 0.08 \text{ [1/year]}. \qquad (1b)$$

Work, as explained by P. Atkins (2007, pp. 3–37), is an action against opposing forces, such as gravity, friction and resistance. The author points out, however, that even the work of electricity can interact with the force of gravity. If intellectual work requires a brain, then it must also be related to the work of electricity. Theories and accounting systems focus on the measurable value of the capital contained in objects or assets. Capital is embodied in the assets that make it measurable and is expressed by the fundamental nature of double-entry accounting (Kurek & Dobija 2013, pp. 16–24). Business transactions are recorded in this way because capital can only be transferred;

it cannot be created. Capital, whose concentration increases the value of an object, is transferred in the economy mainly via labour.

One contemporary theory of capital (Dobija & Kurek 2013, pp. 293–304) maintains that labour and capital are complementary: labour represents the dynamics, that is, the transfer of capital from a source, and capital is the potential ability to perform work. Labourism thus rejects the unwise and conceptually confusing determination of capital as machines, money and real estate. A scientific approach requires the concepts to be arranged correctly: capital accumulates in assets through transfers known as "labour" or "work". The measurability of capital is thus due to the measurability of work. The measurability of assets and their value is derived from the capital they contain. The category of resources remains unchanged; resources are countable only in natural units and are not measurable in units of labour. Assets are measurable because of the capital they embody.

The formula for measuring work applied in physics shows two equivalent models when presented in a simplified scalar notation without vectors. The measure of labour in this simplified scalar description is:

$$L = F \times s \times \cos \varphi = F \times v \times t \times \cos \varphi = P \times t \times \cos \varphi, \qquad (2)$$

where L – scalar mechanical work; F – scalar force; v – speed scalar; $\cos \varphi$ – cosine of the angle between direction of force and direction of movement; P – scalar of power; and t – time of completion of work.

In economic practice, and particularly in employment contracts, the formula containing the second part of equation (2) is commonly, though perhaps unconsciously, applied to the categories of power and the passage of time. Assigning an employee a rate of payment determines the potential power (P). If an employee is assigned to a position paying USD 3,000, and the highest salary is USD 15,000, the power factor is 1/5 and 180 hours of work per month is equal to $(1/5 \times 180) = 36$ units of labour. By this account, 36 labour units = USD 3,000, so 1 USD = 0.012 of a basic unit of labour. It does not matter in the economy what part of the 1 labour unit is 1 USD. This unit is adopted as the basis of economic calculations; the dollar is simply a common unit of labour. Since the power coefficient is determined as the quotient of wages, the measurement of labour in the economy can be described as follows:

$$L = P \times t \times \cos \varphi = W/W_{max} \times t \times \cos \varphi = H/H_{max} \times t \times \cos \varphi, \qquad (3)$$

where W/W_{max} denotes individual wages and H/H_{max} denotes the personal human capital of the employees in question. Combined with managerial control, the self-control of individuals makes it possible to assume that cos φ is equal to 1.0.

Since economics is an emergent science when compared to physics, additional interpretation is needed. As we know, if the direction of a force is not in line with the direction of a predefined path, the force vector is corrected by the tilt angle of cos φ. The size of cos φ is usually overlooked in economics, which may be unwise given that it indicates the extent to which work has been done efficiently. In the context of economics, work is done to achieve managerial and social goals. However, as the example of a gang of thugs demolishing a bus stop demonstrates, we are also confronted by efficiency where the aim is to destroy. In this case $\varphi = 180°$. Hence, cos $\varphi = -1$. If GDP were to be measured properly, the negative value assigned to the thugs' work ought to be added first. Only then would the positive value of the repair team's labour be added. The impact on GDP would then be close to zero. Today, though, only the work of the repair team is counted.

Measuring work, which makes it possible to measure other economic values (notably capital), supports the identification, measurement and reporting required to control the economic system. Yet labour simply transfers the capital located in objects – particularly that inherent in employees and assets – to products of all categories. In this way only the value of the employees' current work and the value of work concentrated in a very wide range of assets are visible in the *ex post* economic computations. Y. Ijiri (1999, pp. 177–90) writes the following with respect to the important aspect of economic theory that is accounting:

In contrast to the labour theory of value, which focuses on input, the utility theory of value focuses on output; hence, it does not question how and through what process a product was produced as long as the output possesses the same use value. Thus, the cost principle would not have a common linkage with the utility theory of value as it does with the labour theory of value.

Other authors such as R.A. Bryer (1994, pp. 313–40) have proved that Marx's theory of value is superior to the marginal theory of value in the case of financial reporting.

Utility theory, whose idea of value is primarily focused on the product (output), marks a completely different approach to economics. Though it is the prevalent theory in the economic literature, practise is dominated by

information from accounting systems and financial statements, in which the economic value of assets of any kind is determined by the concentration of capital transferred through work. Labourism can thus be seen as a system of scientific knowledge that applies the paradigm of labour and capital in tandem. What is more, money is generated naturally in the process of work.

Measuring the capital embodied in an asset may determine its value, but market value is determined by the market price which, as the stock exchange demonstrates, is swift to deviate from the value of an asset. This is why the valuation process – valuing an asset by measuring the capital embodied in it – is so complicated and uncertain. The main reason for this uncertainty is a quality of nature determined by the second law of thermodynamics, one of whose many formulations states that no potential (remember: capital is only the potential capacity to do work) stays at the same level forever. Worse still, however natural it may be, potential dissipates over time. Everything is getting older, which means that initial capital declines. This loss of value by natural dispersion could, however, be replenished by transfers of capital through labour. We know that fixed assets are repaired, individuals are fed and cured, and materials are produced. It is in this way that the economy is driven by labour. Value combined with the tandem of capital and labour forms a triad of fundamental economic concepts.

Money, which is related to labour, capital, assets and value, is also an abstract category that can be correctly discerned only by human intellect. Neither silver nor gold is good money. Instead they are material assets good at retaining the capital value lent to them by labour. We are very close to an accurate idea of money if we understand a banknote in a worker's wallet as a record of work receivable. This does not apply to the cash emitted by central banks, which has no relationship to the labour of employees.

If we add money understood as work receivable to the capital-labour-value triad we arrive at a tetrad of the most important categories in economics. That they are still largely unacknowledged and even now remain a source of confusion is attributed to their intangibility: we have no access to them through our senses. Though confusion is severe in the case of both capital and money, the acute dangers to economic life lie in the misunderstanding of money. The great singularity of the money economy is overlooked because money is misconceived. It is a fact that labour increases value and creates money. This means that labour is always self-financing.

Capital, which flows from initial assets and human capital via labour and work receivables before returning again to assets and human capital, relies on circular flows in the money and goods economy. The work receivables

become assets in the form of cash and deposits. The natural forces quantified by ECPG = 0.08 [1/year] make it possible for capital to grow. A yearly flow thus yields the average increase in initial capital determined by ECPG. It should be noted that people also decide to locate capital in human resources. Indeed, one of the factors on which a country's welfare and economic standing greatly depend is the proportion of assets engaged in the productivity of human capital.

It is labour that transfers capital to products (assets and utilities) and gives them value, and it is work done that generates records of work receivable, that is, money. This is seen clearly in the case of companies, where the cost of labour becomes the cost of the products, and the money expended as a cost of labour is returned in the form of sales revenues. The case of teachers and other public-sector workers, who also create indispensable value by doing their jobs, is an interesting one. All of the professional activities accomplished by teachers, policemen, soldiers and other public--sector workers transfer capital to specific workplaces and communities, for which periodical payment should be made in the form of work receivables. This is the task of an authorised institution, namely a reformed central bank.

3. The Brilliance of the Money Economy and Self-financing Labour

It is well known that the theory of money has always been a weak point in economics. The tetrad of fundamental economic ideas we encountered above leads us to perceive money as an abstract category and to understand that it is the labour process that generates work receivables, that is, money. This explanation demonstrates that money is consistent with fundamental laws, which stands in sharp contrast to the way central banks generate money by fiat. This is one means of conducting the money economy but it is an invalid one that continues to cause difficulties. What is more, an economy of this nature is not a pure market and is far from being self-regulating. When money is controlled by central banks the consequences are inflation, deflation, manipulation, crises, deficits and high taxes. All complications vanish when, in accordance with the fundamental tetrad, money arises in a natural way as a record of work receivables.

Money is thus neither a material nor a product. It does not rely on the law of supply and demand and it is not a medium of exchange. Our entire stock of human experience confirms that money as such is exchanged for products and vice versa. Proper economic management provides the economy with assets that increase labour productivity. Employees' bank

accounts will then grow as a result of the work that they have done. Unlike in an economy dominated by the view that "we cannot do it since we do not have any money", a labour-driven economy creates conditions in which people come to understand that they possess the resources and talents to build anything. It is extremely important to understand that, in a properly run money economy, labour is self-financing and does not depend on funds from taxation. This way of thinking has the power to liberate us from budget deficits and to alleviate unemployment. Let us now examine money and the unit of money.

In a passage describing the battle over monetarism between Milton Friedman and John Maynard Keynes, T. G. Buchholtz (2007, pp. 229–34) tells a tale that both illustrates a widespread opinion of money and tells us something of its essential nature:

What is money? Anything can be money, including shells and beads; cigarettes often serve as money in prison. In today's macroeconomic lingo, we follow the Federal Reserve Board definition of money supply. The most popular measure is called M1.

How can someone regard money as a material, which by definition must be scarce, and at the same time expect there to be a supply of it?

Buchholtz adds (2007, p. 170): "Why would anyone be foolish enough to argue about the money supply? The more money, the merrier, right? Wrong. (…) If the amount of money overwhelms the capacity to produce goods, consumers, with more money to spend, bid up prices".

The present state of knowledge regarding the monetary unit is clearly expressed by A. V. Banerjee and E. S. Maskin (1996, pp. 955–1005):

Money has always been something of an embarrassment to economic theory. Everyone agrees that it is important; indeed, much of the macroeconomic policy discussion makes no sense without reference to money. Yet, for the most part, theory fails to provide a good account of it. Indeed, in the best-developed model of a competitive economy – the Arrow-Debreu framework – there is no role for money at all. Rather than there being a medium of exchange, prices are quoted in terms of a fictitious unit of account, agents trade at those prices and that is the end of the story.

The literature contains much evidence of scepticism regarding the present theory and practice of money. R. W. Garrison (2001, pp. 7–8), for example, who represents the contemporary Austrian School of Economics, expresses the moderate opinion that:

Unavoidably, the medium of exchange is also a medium through which difficulties in any sector of the economy – or difficulties with money itself – get transmitted to all other sectors. Further, the provision of money even in the most decentralised economies is – not to say must be – the business of the central authority. (…) Money comes into play both as a source of difficulties and as a vehicle for transmitting those difficulties throughout the economy.

Problems with the present monetary system have recently been raised by a group of thinkers including Lietaer (2004, pp. 1–23) and Rushkoff (2008, p. 244), who have proposed open source currencies. D. Rushkoff explains:

Open source or, in more common parlance, 'complementary' currencies are collaboratively established units representing hours of labour that can be traded for goods or services in lieu of centralized currency. (…) So instead of having to involve the Fed in every transaction – and using money that requires being paid back with interest – we can invent our own currencies and create value with our labour (…).

Insofar as it correctly conceives of money as standing in strict relation to labour, this is a progressive concept. It remains unsatisfactory, though, in the sense that complementary money will not make our tough existences any easier. What we need instead is complete knowledge of the essence of the money-goods economy. If we can provide a satisfactory account of what money is, we may be on the way to securing that economy. For now, we can state with some degree of certainty that money represents the receivables we are due from our work. Money arises as confirmation of work that has been done and represents the value of labour transferred by labourers. The real transfer of human capital into products occurs only in the labour process, which is why we can say that labour is always self-financing.

The essence of the money-goods economy is the continuous market confrontation of two streams which, as Figure 1 shows, are activated by the potential of human capital and its work. The first stream (on the left--hand side) represents the value of the end products generated by the current labour of employees (W) and the past work embodied in different sorts of assets. The second stream represents compensation (W), that is, receivables due for work. The source of these two streams, at the edge of which lies the exchange of money (work receivables) for products, and of products for money, is the same human capital of employees. We can employ the wage equation of exchange to describe this. The streams are always flowing, so we use annual variables – in particular GDP – to capture the quantitative relations. The final production exchanged on a market for a given year is the value of GDP at current prices. GDP is also the product of labour costs W and of work productivity Q. In this way GDP $= W \times Q$.
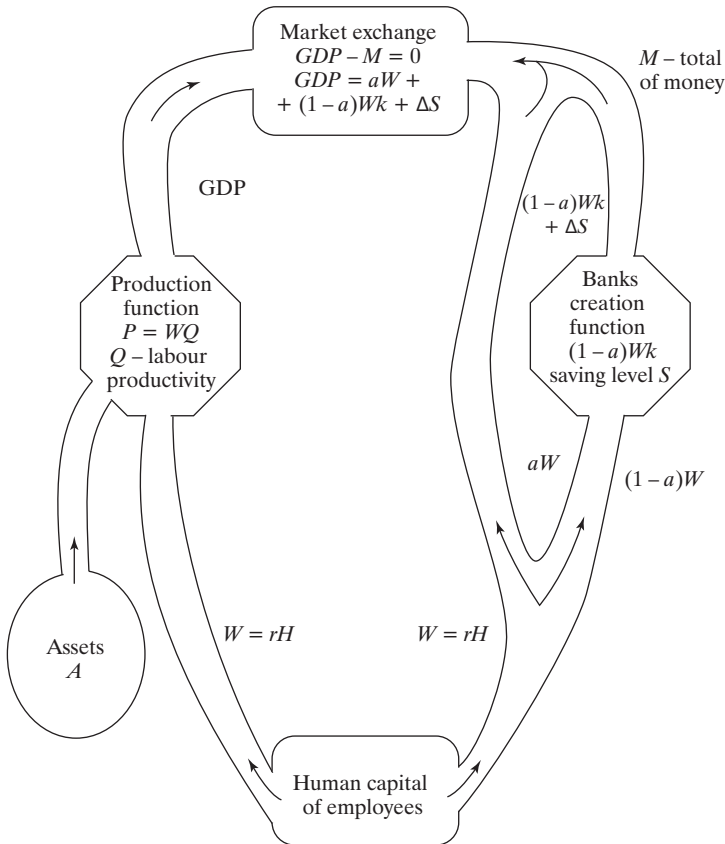
Fig. 1. The Market as a Mechanism Levelling the Value of Product and Money Streams

Source: a modified version of the figure presented in Dobija (2011a).

The value Q is a factor of the cost of the original production function (Dobija 2011a, pp. 142–52; Dobija 2015b, pp. 86–94). The production function, which is made up of the measurable variables H (representing the human capital of employees) and W (compensation), takes into account J. Robinson's (1953–54, pp. 77–89) criticism of the econometric modelling of production. If it is possible to assign value to the human capital of employees, the way is open to formulate a production function and model adequate to labourism. If L denotes a fair fixed wage and H represents the personal human capital of workers, the product $L = p \times H$ (p = ECPG) helps to determine the value of H. We now have a platform on which

both the production function and, later, an adequate production model, can be constructed. The production function reveals the factor of labour productivity Q, which may be applied to outstanding effect in economics.

As well as all of the additional components that determine the value of W, the right-hand stream represents remuneration. A proportion of remuneration, aW, where $0 < a < 1$, passes directly to market exchange, while the second part of the compensation stream $(1 - a)W$ flows first to the system of commercial banks in the form of savings and pension funds. At the commercial banks this stream can be increased by multiplier k to the volume of $(1 - a)Wk$, which is the result of lending and pensions payments. Part of this inflow remains in bank accounts due to other provisions and the requirement to maintain liquidity. Figure 1 illustrates work (human capital transfer) as the driver of the money economy.

The confrontation of these two streams in the market (the value of products and total money) is what finally determines the purchasing power of money and the final market value of products. An indication of the relationship between products and money may be obtained by taking a quantitative perspective of their bi-directional exchange and expressing it in the form of the wage equation of exchange. The wage equation of exchange is introduced under two conditions: work finances itself and generates money as work receivables, and pension funds are to be regarded as a form of savings.

It should be noted that Figure 1 encompasses the work of every employee, including farmers, workers in industry, teachers and police officers. This is easier to understand if GDP is understood mainly as the sum of the current labour and past labour embodied in the assets measured by depreciation. The formula for this method of calculating GDP is as follows:

GDP = Total pay + Depreciation + Taxes + Gross profits + Change in *Bb*.

Bb here denotes the initial balances of products. Figure 1 also helps us to see how past work serves the future. Let us take the example of a group of workers who built a bridge and then retired. They received money in the form of work receivables transferred to their bank accounts as remuneration, and the costs of their work became a part of the bridge's value. Now retired, they receive payments from capitalised retirement funds (right stream), while an amount representing the bridge's depreciation through use flows in the product stream on the left. The work of retired teachers or police officers, who have contributed to the growth of human capital, is returned to

them as a result of the work that capital now does to increase current GDP and so fund their pensions.

The wage equation of exchange balances the value of GDP with the sum of money *M*. According to Figure 1, this equation is as follows:

$$GDP = GDPR(1 + i) = a \times W + (1 - a) \times W \times k + c \times S \qquad (4)$$

$$\text{or } GDP = GDPR(1 + i) = a \times W + (1 - a) \times W \times k + d \times W. \qquad (5)$$

The symbols of the values are as follows: *GDP* – nominal GDP; *GDPR* – real GDP; *W* – labour costs; $Q = GDP/W$ – work productivity index; $Q_r = GDPR/W$ – real work productivity index; *i* – inflation (deflation) rate; *k* – coefficient increasing the value of stream $(1 - a)W$ as a result of credit action taken by the banking system, $d = c \times S/W$.

The multiplier (*k*) is determined based on equation (5). Assuming $i = 0$, which denotes zero inflation and a state of deflation, we obtain the equation (6):

$$GDP = GDPR = a \times W + (1 - a) \times W \times k + d \times W. \qquad (6)$$

Equation (6) divided by variable *W* gives:

$$Q = Q_r = a + (1 - a) \times k + d. \qquad (7)$$

Hence the formula determining the multiplier *k* is as follows:

$$k = (Q_r - a - d)/(1 - a). \qquad (8)$$

The credit required is therefore presented as:

$$\text{Credit} = (1 - a)W(Q_r - a - d)/(1 - a) = W \times (Q_r - a - d). \qquad (9)$$

This formula involves only the main macroeconomic variables, which are those that have an impact on the credit-generation requirements of commercial banks. There are a number of further constraints on lending, including, primarily, the need to ensure the safety of commercial banks. Formula (9) explains that the credit value depends on the remuneration stream *W*, real work productivity Q_r and the level of wealth (*a*), as well as on changes in savings and detriment funds. As the productivity of work grows, which depends to a great degree on the value of assets, there are more opportunities to extend credit and the demand for it is greater.

In this system, the central bank does not generate cash money by fiat and has no tools to assist commercial banks. The requirement to maintain liquidity must therefore be strictly and rigorously observed. As the

guardian of citizens' money, the banking system must furthermore operate under the permanent supervision of state institutions. One of the tasks of a reconstituted central bank is to safeguard work productivity Q and to ensure that the size of the public sector is adequate.

Figure 1 shows the natural exchange and balance achieved by the money--goods economy when money is understood correctly as work receivables. Maintenance of the value of money, so that there is neither inflation nor deflation, is then ensured by preventing a decrease in work productivity (the level of remuneration) measured by the ratio Q, and adhering to the designated credit volume. Given, though, that the systems for the measurement and management of work processes are never perfect, a low level of inflation may occur. In this case it may be desirable to introduce a modest payroll tax. Under present arrangements, on the other hand, financing work in the public sector from taxes leads to a situation in which the value of market products and services (GDP) is not fully balanced by the value of total money (M). In the majority of cases this value is lower in the tightly-governed and well-developed economies because of the direct taxation of remuneration. In other words, the value flow represented by the stream of products is significantly greater than the value flow represented by the streams of money and credit. This is a reason for deflation.

Where the remuneration of public-sector employees is funded from taxes there is a risk of deflation and of other economic imbalances. It is therefore a requirement of a correct and natural economics that their pay should not be funded from this source. What is more, no direct tax should be imposed on the salaries earned by public-sector employees which, in a correctly organised economy, should be paid by a reformed central bank. This institution will be given the authority to issue money, that is, to make a record of work receivable as payment for work done in the public sector. These records would offset the work liabilities of the institution employing the public-sector workers and transfer the value of their salaries to their accounts at commercial banks. By supervising national labour productivity Q, a reformed central bank would also control the size of the public sector.

4. Fair Compensation as a Fundament of a Balanced Economy

The model for measuring human capital is derived from the general model of capital growth (1). No value is assigned to infants, who enter the world as gifts of nature. Rain or sunlight, which are natural resources, are deemed to be free. Though photosynthesis does much to bring wheat or coal

into being, these products accumulate value through the costs of mining and transport in the case of coal, and of planting, harvesting and transport in the case of wheat.

There are two variables in the general model of capital (random dispersion (s) and the inflow of capital through labour (M)), and the economic constant (p). While it is clear that the forces represented by (s) would be damaging to an infant, they are offset by the efforts of parents and of society (labour M). The only variables that play a role in human capital development are therefore the economic constant (p) and the passage of time. The basic model of human capital measurement $H(p, T)$, as introduced in Dobija (2011b, pp. 780–87), may therefore be determined by the formula:

$$H(p, T) = [K(p) + E(p)][1 + U(T, w)], \tag{10}$$

where: $K(p)$ – denotes the capitalised value of the cost of living; $E(p)$ – denotes the capitalised value of the cost of professional education; p – capitalisation rate = 0.08 [1/year]; $U(T, w)$ – denotes the type of learning function and a learning parameter (w); T – denotes the number of years worked in a professional occupation.

This model may be reshaped in the equivalent additive approach:

$$H(p, T) = K(p) + E(p) + D(T, w), \tag{11}$$

where $D(T, w)$ denotes capital gained from professional experience. This way of measuring human capital allows us to derive a compensation model for the work of a person with human capital $H(p, T)$. The fundamental principle of fair compensation follows from the second law of thermodynamics. The capital an individual embodies depends on the law of spontaneous and random dispersion (s). The minimum annual compensation for an employee is therefore determined by the formula $W = s \times H(T, p)$. The natural dispersion of the human capital is then offset, and the human capital of the employee maintains its value. Since (s) is a random variable with a mean value $E(s) = p$, the formula suitable for wage estimation is $W = p \times H(T, p)$. The measurement of human capital and the question of fair compensation have been explored in a number of studies. In addition to the cited authors they include papers by M. Dobija (1998, pp. 83–92), D. Dobija (2003), W. Kozioł (2014, pp. 156–93) and J. Renkas (2012, pp. 345–56).

Compensation usually has two components: basic pay and bonus pay. Basic pay is stipulated in employment contracts or established as part of other arrangements. It is worth noting that assigning basic pay to an

employee determines their recognised potential power. This is consistent with the well-known measurement of labour L as a product of power and time (L = power × time). Here the coefficient of power is the quotient $H(T)/H_{max}$, where H_{max} is the human capital of the employee with the highest value for human capital. Determining the potential power ratio is an essential element of employment contracts.

It would appear that workers' labour L was already being measured in line with the formula L = power × time in antiquity. According to archaeological evidence, and interpretations of clay tablets containing records of labour performed by different groups of workers, an economic system driven by labour existed in the third millennium BC. It is claimed by Struve (1969, pp. 127–72), who examined the organisation of labour in Sumer, including in documents from the archives of Lagasz and Umma, that:

> The tablets contain records of the numbers of labourers, male or female, as the case might be, who were to perform one or several tasks connected with agriculture, under the supervision of the overseer. The time assigned for the performance of each labour operation is sometimes estimated in days, and sometimes in months; but in the majority of cases it is given as one day: (so many labourers for one day). The meaning of this formula occurring in these small documents, which I called primary, was fully revealed as a result of comparative analysis of the large reports of the overseer compiled on the basis of the primary documents, recording work performed by the labourers of their gang during a certain period. (…) From this I inferred that the Sumerian accountants had a notion of man-day.

It is therefore clear that these accountants computed the costs of labour in man-days. Struve (1969, pp. 127–72) also found that: "In addition to the unit of labour force, the scribes distinguished such quantities as 5/6, 2/3, 1/2 etc. of a unit of labour force. The labourer whose productivity of labour was estimated at 5/6, 2/3, 1/2 etc. of a unit of labour force, received grain ratios proportionately reduced". The conclusion is clear. At the beginning of civilisation labour was measured as the product of power and time, where the factor of power was determined by a positive number expressing a fraction of an employee's power. Our present compensation practices are thus only a contemporary generalisation of these ancient methods. Labour is measured as a product of power and time in both physics and economics. In physics the unit of power is additionally fixed, while in economics it is a positive fraction $H(T)/H_{max}$.

Alongside the three natural factors, $K(p)$, $E(p)$, $D(T, w)$, creativity capital is the fourth component of human capital. If we agree that the inventions of Tesla and other great inventors and scientists have been underpinned by

outstanding creativity as well as by education and experience, and if we can apply the same thinking to sportsmen and sportswomen, whose capacities can be measured by the market, it is right to add one more factor to the model (11): creativity capital C_r. The additive model of human capital will then be composed of four elements:

$$H(T, p) = K(p) + E(p) + D(T, w) + C_r. \tag{12}$$

Creativity capital is not measured by capitalised costs. In the case of footballers and other sportsmen and sportswomen it is the market that estimates their creativity capital. The DCF approach is in general suitable for obtaining C_r.

A special IRR equation (13) written for one year can be employed to corroborate the compensation model:

$$H(T, p)(1 + r) = W + H(T + 1, p), \tag{13}$$

where T denotes a chosen year of employment, r is an expected rate of return and W denotes wages. The right-hand side of the equation states that an employee receiving wages W over a period of one year accumulates personal human capital and has one further year of experience. Solving the IRR equation we obtain the formula (14):

$$W = r \times H(T, p) - \Delta D(T, w). \tag{14}$$

Compensation W is thus first of all a percentage of the employee's human capital r. The factor $r \times H(T, p)$ can however fall due to the additional experience gained as each year passes, which is represented by factor $\Delta D(T, w)$.

Formula (14) shows that the experience gained over the course of the year belongs to the organisation that created the post. When T grows, the factor $\Delta D(T, w)$ returns quickly towards zero. The general formula for compensation is therefore $W = r \times H(T, p)$. If $r = $ p this is the fair minimum pay. Research conducted by Kozioł (2014, pp. 156–93) has shown that the average value of r in a company that is working normally is 10%. This means that bonus pay adds approximately 25% to basic pay (8% of the human capital). Basic pay makes it possible to maintain employees' human capital (see the computations in Dobija 2014a, pp. 1–9 performed for the year 2014), while bonus pay provides further motivation and the opportunity for employees to improve their economic position. That the present value of the stream of basic pay ($p \times H(T, p)$) is not less than the initial human capital

confirms this. If basic pay is $L = pH(T, p)$, so $PV_\infty = pH(T, p)/s$, where (s) is the ratio of dispersion and $H(T, p)$ remains constant for a further number of years. If the random variable (s) is replaced by the mean value $p = E(s)$, then $PV_\infty = pH(T, p)/p = H(T, p)$. This proves that the stream of wages is equal to $H(T, p)$. Human capital is thus preserved.

The human capital model and the compensation formulas both include the constant p. Fair pay can be understood as $W = p \times H(p)$, which means that the impact of the constant is very strong. The application of the economic constant $p = 0.08$ protects wages against the uncontrolled relativism mentioned by Barrow (2003, pp. 201–91) in his work on the role of constants in the scientific description of the world. It has been demonstrated that wage levels set through the measurement of human capital are fair in the sense that they prevent the depreciation of employees' human capital. Plato, as we know, recommended long ago that the incomes of the wealthiest Athenians should never exceed five times that of the city's poorest residents. According to calculations of human capital – leaving aside creativity capital – the range of fixed wages should adhere to the same proportion. Yet this is not the case, for example, in Poland, where the average incomes of the wealthiest 10% are almost ten times greater than those of the poorest 10%. We should remind ourselves, however, that this does not take creativity capital into account. An individual's identifiable creativity capital may account for their very high earnings. Cases such as these are theoretically consistent.

It can be observed in practice that, with the exception of the USA and China, the weaker a country is economically and organisationally the higher is its Gini wage index. The Nordic states of Denmark, Sweden, Finland and Norway, as well as Austria and Slovenia and many developed Western countries, have a Gini wage index of approximately 30.0 and below. We can make a rough assessment of a proper or desirable level for the Gini wage index in respect to wage income by measuring human capital, a task which was undertaken by Kozioł (2009, pp. 21–32), who studied the diversity of a group of employees in terms of education and experience. His approximate result was 0.24. Poland, whose real index is estimated to be some way above 0.30, has excessive wage inequalities.

5. An Economy without Budget Deficits; Elementary Modifications to Tax

Self-financing labour can contribute to all remuneration paid in the public sector, which means that there is no need to draw on funding from taxation.

This does not mean, though, that the public sector can grow unchecked. The size of public sector compensation depends on the labour productivity ratio. The theory presented here rests on the firm assumption that the Q ratio does not decline. The most likely outcome would be continuous, slow growth. The computations of Q for the USA and Poland are presented in Table 2.

Table 2. Labour Productivity Ratio (2014)

Country	Poland	USA
GDP in 2014	PLN 1,729 billion	USD 17,419 billion
Total hours worked	32,069 million hours	262,055 million hours
Average rate per hour	PLN 27.00	USD 19.00
Q – labour productivity ratio	1.997	3.577

Source: The Conference Board Total Economy Database, May 2015, http://www.conference-
-board.org/data/economydatabase/. Accessed: 7 August 2015; http://www.statista.com/
statistics/263591/gross-domestic-product-gdp-of-the-united-states/. Accessed: 7 August 2015.

As shown in Table 3, it is now possible to divide GDP according to labour share and assets share. A coefficient of 0.23 was applied to calculate public sector compensation for Poland, which was discussed and approved by a team from the Polish Ministry of Finance. A lower coefficient of 0.20 was selected for the USA because, unlike Poland, it is not a post-socialist country with a massive public sector. The adoption of 0.2 as the factor determining the relationship between public-sector remuneration and all remuneration in the USA reflected a cautious attitude to calculating the expected benefits, which could be considerably greater. The total gross annual benefits of applying the self-financing of labour were estimated at almost USD 974 billion. This amount would of course be reduced due to gains from money emissions, that is, gains from the central bank. This position would gradually disappear. The calculations are set out in Table 3.

It would be an absolute necessity to use the additional money (PLN 160,634 million in the case of Poland) to exempt the legal minimum wage, and pensions and benefits paid at that level, from direct payroll tax. The legal minimum wage is consistent with the theory of human capital in the USA and in many developed countries. It has been demonstrated (Dobija 2011b, 2015) that setting the minimum wage at that level allows human capital to be preserved. Unfortunately, this is not the case everywhere. The legal minimum wage is at approximately 85% of its theoretical value in Poland and approximately 50% in Ukraine. Labour productivity in Poland and Ukraine is not high enough to permit a legal minimum wage to be consistent with the

theory of human capital (Dobija 2011b, pp. 780–87). This raises the problem for employees earning the minimum wage of how they can maintain their human capital. Their natural response is to seek employment abroad.

Table 3. Labour Share of GDP and the Effect of Labour Self-financing (Data for 2014)

	Country	Poland	USA
1	GDP in 2014	PLN 1,729 billion	USD 17,419 billion
2	Q – labour productivity ratio	1.997	3.577
3	Labour share GDP/Q	PLN 865,799 million	USD 4,869,723 million
4	Asset share	PLN 863,201 million	USD 12,549,277 million
5	Public sector compensations	$0.23 \times 865,799 =$ = PLN 199,134 million	$0.20 \times 4,869,723 =$ = USD 973,945 million
6	Budget deficit	PLN 30,000 million	USD 483,000 million[a]
7	Gains from central bank	PLN 8,500 million	USD 96,900 million
8	Surplus (5) – (6) – (7)	PLN 160,634 million	USD 386,100 million

[a] Joint Statement of Treasury Secretary Jacob J. Lew and Office of Management and Budget Director Shaun Donovan on Budget Results for Fiscal Year 2014.

Source: http://www.treasury.gov/press-center/press-releases/Pages/jl2664.aspx. Accessed: 8 August 2015.

An adequate minimum wage for all employees is 8% of their personal human capital, which refers to the capital acquired from professional education and from experience. Based on research into human capital, there are grounds to suggest that payroll taxation is consistent with the principle of preserving employees' capital. A small, direct tax is however possible when the unproductive activities present in all jobs are taken into account. For this reason a modest payroll tax might be acceptable in the case of higher earnings. The proposal is as follows:

– pay at the level of the minimum wage (MW) and equivalent incomes is tax free,

– pay greater than the MW and less than 5 × MW (the Plato rule) may be taxed with a ratio not exceeding 10%. The amount of any excess above the MW is subject to tax,

– pay greater than 5 × MW could be taxed at a higher and progressive rate. The amount of any excess above 5 × MW could be taxed progressively. Progression can be reduced in comparison to the normal ratio in the case of individuals with demonstrable creativity capital.

Despite self-financing labour, a country still needs to finance the maintenance of existing fixed assets and new investment in the public sector. The assets share tends to be larger in the case of richer countries. Hence the USA's assets share is 72% and its labour share only 28%. In Poland, which is a much poorer country, the assets share is almost 50%, which means that the labour share is almost identical. There is thus a need to raise taxes to finance public assets, such as roads, motorways, bridges, buildings, infrastructure, school equipment, research facilities and army equipment. One simple and efficient way to do this is to introduce a sales tax such as that applied in the USA.

Since these organisations draw on social resources in the form of people, infrastructure and the legal framework, income tax from corporations and companies is another source of public revenue. Parents have to work hard to increase the human capital of their descendants, while schools also contribute to the growth of human capital. Though businesses employ this human capital, and often pay a fair remuneration in return, the work of mothers is not taken into account. There are very good reasons, such as to contribute to infrastructure maintenance, why business organisations should pay income tax. It should be set at a level that depends on income over a given period.

According to research concerning the economic constant of potential growth (Dobija 2015, pp. 578–94), the standard or benchmark value for return on assets is 0.08 [1/year]. The most advanced study of the rate of return on assets has been made by Kurek (2011, pp. 122–25), who studied entrepreneurship. Return on assets (ROA) expresses the ratio of profit (capital increase) to the total capital included in a firm's assets. Kurek based his study on the balance sheets and income statements of all of the companies belonging to the S&P 1500 over a twenty-year period. The author conducted a statistical survey to test the hypothesis that the average risk premium estimated by ROA, and calculated using *ex post* data, would be 8.33%. The hypothesis was not rejected by the results. The confidence interval at a confidence level of 0.99 was 8.25%–8.89%, while the mean was 8.57% and the standard deviation 14.81%. Since the relative precision of estimation was 3.75%, the relative error did not exceed 5.0, which indicates that the statistical forecasting was reliable (Kurek 2012, pp. 364–72). Kurek also examined data from smaller collections, such as the S&P 600 (small companies) and the S&P 400 (mid-sized companies). Both returned similar results: the average for the former was 7.41% and the average for the latter

was 8.85%. A greater relative error was recorded, but it was insufficient to invalidate the statistical forecasting.

We turn now to the sources of profits. The correlation between corporate profits and profits on shares is clear. Enterprises calculate the depreciation of fixed assets and usually pay a fair rate for the work of human capital, neither of which allow for the depreciation of capital. Companies pay for supplies and they also pay taxes to the external environment. If businesses are managed reasonably, we are entitled to expect that all of their contractors will obtain a fair share of the surplus created. If we rule out malpractice, what is the source of profits? This is of course not comparable to risk, which is the source of unforeseen costs and losses. The answer lies in nature which, as the physiocrats already knew, provides for the reproduction of capital and the creation of surplus value.

Górowski (2010, pp. 160–69) has introduced the remarkable idea of combining two aspects of income tax. The first is driven by the need to pay for the exploitation of social wealth and resources (the fixed part) and the second is the amount of income earned (the variable part). This involves the idea of standard income (I_s) determined by the economic constant of potential growth $p = 0.08$, which is thus the value $I_s = p \times C_0$, where C_0 denotes the capital embodied in a company's assets at the beginning of the year. Therefore, if t_e denotes the tax rate of the fixed part, and t_v denotes the tax rate of the variable part, the income tax on an actual income (I_a) is determined as follows:

$$\text{Income tax} = t_e \times I_s + t_v \times (I_a - I_s). \tag{15}$$

Taxation is strongly associated with government policy which, if it is to be conducted wisely, should be based on scientific research and stable facts. While it is the task of economic theory to answer questions about the sources of profits and the indicator of the standard return on assets, it is left to politicians to set tax rates.

There are ways in which this idea may be enriched. As discussed by D. Dobija (2003, pp. 187–209), the ROAH ratio is a natural generalisation of ROA because it takes account of the capital embodied both in assets and in employees. Thus $\text{ROAH} = (I_a + p \times H)/(A + H)$. The human capital can be estimated from the formula $L = p \times H$. In this way $H = L/p$, where H denotes the human capital of a company's employees and L denotes basic pay. Then the ratio $\text{ROAH} = (I_a + L)/(A + L/p)$. Since it involves both assets and human capital, a generalised ratio of this kind is more adequate for all company forms.

The proposals set out above for payroll tax and company income tax make intensive use of the economic constant of potential growth, which is a scientific fact stating that under normal conditions the average growth rate of capital in an economy is 8%. Barrow (2003, pp. 201–91) wrote the following in the conclusion of the book he published exploring the role of constants in explaining reality: "Our discovering of the patterns by which nature works and the rules by which it changes led us to the mysterious numbers that define the fabric of all that is. The constants of nature give our universe its feel and its existence. (…) They define the fabric of the universe in a way that can side-step the prejudices of a human-centered view of things". We would be well served if the fundamental laws and constants were taken into account in the policy-formation process, which would bring the further benefit of anchoring the debate in reality. It is the spirit of this idea that underlies this paper.

6. Conclusion

If labourism is to be implemented as the main theory of the economy, one of the fundamental requirements is that the labour productivity ratio Q, which occupies a central place in the formulas resulting from the wage equation of exchange, must not be allowed to decline. The Q ratio limits total pay and, as a consequence, public-sector compensation. If this principle holds, money maintains its value and the public sector is limited to its proper dimensions in the economy concerned. The exchange rate of a country's currency changes due to the parity of labour productivity, that is, in the case of USD and PLN, the value of quotient $Q_{\text{Poland}}/Q_{\text{USA}}$ determines whether the Polish zloty (PLN) is weaker or stronger (Jędrzejczyk 2012, pp. 780–85). As has been stated elsewhere (Dobija 2014a, 2014b), countries in which Q does not decline can participate successfully in currency integration because they do not generate inflation.

Figure 1 illustrates the very essence of the money economy and explains the disturbing role of payroll tax. In that it naturally prevents the depreciation of human capital, compensation should be fair. When this is the case, employees create adequate demand. Yet taxation means that the compensation of large numbers of employees is unfair. The stream of money then has too low a value compared to that of products. A sales tax, on the other hand, does no direct harm to human capital. If one is introduced, the cost of living will rise and compensation will need to be raised to a fair level in response. The most important point to grasp is that labour finances

everything in the economy. It is for this reason that labour itself, including – very importantly – public-sector labour, never requires financing. The application of these ideas will produce a balanced economy with no budget deficit or destructive taxes.

Many years ago, Benjamin Franklin expressed the rather gloomy opinion that: "in this world, nothing is certain except death and taxes". This distinguished and most respected polymath may have lived at a time when money circulated in the form of coins, but Weatherford (1997, pp. 132–35) describes him as "the father of paper money" and relates the story of how, in 1729, he published *A Modest Enquiry into the Nature and Necessity of a Paper Currency*, which helped launch paper money in North America and the rest of the world. At that time there were at least two options available. The first was that paper money could have been understood and accepted as a certificate and measure of work done, in which case the system of paper money would have promoted labourism as the main economic idea. The second was the one that was acted upon. Enforced by the authorities and the banks, this is the way that has brought us to monetarism. The first of the available choices was motivated by the desire to forge an economy in which taxes would be limited. What was entailed in the second, meanwhile, was that giving money to somebody means the authorities have to take it from somebody else and raise taxes to do so. While monetarism is characterised by budget deficits, growing debts and severe taxes, labourism, fortified by its scientific fundamentals, holds out the hope of low taxes and a friendly economy with no budget deficits. While some measure of modest taxation may be necessary to finance public assets, it need not be severe unless a country is at war or preparing for war. Were this vision of a low-tax economy with no budget deficits to come to pass, Franklin's famous remark might lose some of its sting.

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Abstract

Ekonomia z ograniczonymi podatkami. Laboryzm

Przedstawione rozważania wskazują, że układ fundamentalnych pojęć ekonomicznych nie był dotychczas jednoznacznie wyjaśniony. Zrozumienie kapitału i pracy jako podstawowych i komplementarnych kategorii ekonomicznych prowadzi do zrozumienia, że pieniądze są także kategorią abstrakcyjną i powstają w procesie pracy jako należności z tytułu wykonanej pracy. Oznacza to, że praca nie potrzebuje finansowania, ponieważ sama się finansuje, czyli tworzy pieniądze. Uznanie tego stanu rzeczy oznacza potrzebę wprowadzenia rozwiązania instytucjonalnego. Naturalne rozwiązanie polega na nadaniu bankowi centralnemu funkcji płatnika wynagrodzeń dla sektora publicznego i kontrolera wskaźnika produktywności pracy limitującego płace w gospodarce, przy likwidacji dotychczasowej funkcji emisji pieniądza. Ta funkcja nie ma uzasadnienia naukowego, lecz jedynie polityczne. Obliczenia ukazują, że w tym systemie znika deficyt budżetowy i otwierają się możliwości wprowadzenia reformy porządkującej i obniżającej podatki.

Słowa kluczowe: kapitał, praca, pieniądze, wartość, podatki.

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THE IMPACT OF THE EURO AREA MACROECONOMY ON GLOBAL COMMODITY PRICES[*]

Abstract

The aim of this paper is to analyse the links between real and financial processes in the euro area and energy and non-energy commodity prices. Monthly data spanning 1997:1 to 2013:12 and the structural VAR model are used to uncover the relationship between global commodity prices and the euro area economy. The analysis is performed for three sub-periods in order to capture potential changes in this relationship over time. The main finding is that commodity prices in the euro area do not respond to impulses from production (economic activity), whereas commodity prices strongly react to impulses from financial processes, i.e. interest rates in the euro area and the exchange rate of the dollar against the euro, especially in the run-up to the global financial crisis. The study also provides evidence of a tightening relationship between energy and non-energy commodity prices.

Keywords: commodity prices, real economy, financial market, structural vector autoregression model.
JEL Classification: E44, C3, E37, E47, Q17, Q43.

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1. Introduction

The prices of energy and non-energy sources play a key role in economic development. High commodity prices can make production unprofitable and steer the economy into a crisis. This threat is particularly acute in countries and regions that have no resources of their own and so must import raw materials. The problem is exacerbated by the tendency of commodity prices to co-move. Many theories and hypotheses have been advanced to explain the co-movement of commodity prices. The most general interpretation is that it is a response to common, global macroeconomic shocks. The problem is that fluctuations in commodity prices are disproportionate in relation to the fundamental variables. Pindyck and Rotemberg (1990) attribute this excess co-movement to the herd behaviour of investors. In this situation changes in overall price indexes can trigger price movements in any commodity because traders are alternatively in either long or short positions on all commodities for no plausible economic reason. Lescaroux (2009) extends this analysis by taking into account inventory levels for oil and metal prices. Frankel and Rose (2010) refer to four plausible theories of the co-movement of commodity prices: strong global growth, especially in China and India (oil prices are studied in this context by Kilian 2008, 2009a, 2009b; Hamilton 2009; Kaufmann 2011), easy monetary policy and low real interest rates (Frankel 2008; Kilian 2010), speculation (Davidson 2008; Krugman 2008; Śmiech & Papież 2013; Parsons 2010) and the risk resulting from potential geopolitical uncertainties. Sari et al. (2010) point out that oil and precious metals are denominated in US dollars and therefore co-move. The negative relationship between the value of the dollar and dollar denominated commodities follows from the law of one price for tradeable goods. The tendency of investors to stay long in raw materials rather than assets when a period of inflation is expected may be another explanation for co-movement. Akram (2009), who also finds evidence that a weaker dollar leads to higher commodity prices, and that interest rate reductions cause excessive price increases in oil and industrial raw materials, draws a similar conclusion. Different results are obtained by Frankel and Rose (2010) and Alquist et al. (2011), who find no statistically significant relationships between real interest rates and oil prices.

This study aims to answer the following question: Are commodity prices related to real and financial processes in the euro area macroeconomy? There are several reasons why we focus on the link between global commodity prices and the euro area economy. First, the euro area was

selected for the research because it is the world's second largest economy. It had a GDP of approximately USD 12,700 billion in 2013 compared to GDP in the USA in the same year of approximately USD 16,800 billion. Second, the euro area countries have insufficient energy resources, which is why the share of imported fossil fuels in total energy consumption is so high (60% for the EU in 2009) and continues to grow. Finally, to the best of our knowledge, no study has yet been produced on the relationships between the euro area macroeconomy and global commodity prices.

The analysis is based on monthly data covering January 1997–December 2013. The real processes of the euro area are represented by industrial production, while the financial conditions are represented by interest rates. Bearing in mind the significant role of the United States dollar (USD), we adopted the USD/EUR exchange rate for the purposes of the study. Commodity prices are represented by the energy price index and non--energy price index published by the World Bank database. The structural VAR model is used to investigate the relationships as it enables them to be interpreted in economic terms. We use a standard recursive structure obtained by a Choleski decomposition to identify structural shocks (Akram 2009). The analysis is conducted in three non-overlapping sub-periods: January 1997–December 2002, January 2003–December 2008, and January 2009–December 2013. The division of the sample period into three sub--periods makes it possible to test the stability of the relationships investigated and the influence of real and financial processes in the euro area economy on commodity prices. It also makes it possible to analyse the changes in relationships between energy commodity prices and non-energy commodity prices and to take account of the growing share of biofuels in euro-area energy consumption. We should note that biofuels belong to the non-energy index.

The major finding is that commodity prices in the euro area do not respond to impulses from production (economic activity). At the same time, commodity prices react strongly to impulses from financial processes, such as euro-area interest rates and the USD/EUR exchange rate (especially in the period before the global financial crisis). The study also reveals the tightening of the relationship between energy and non-energy commodity prices.

We now move to Section 2, which briefly presents the methodology used in the study. The data are then described in Section 3. Section 4 contains the empirical results. Our final conclusions are presented in the last section.

2. Methodology

The empirical analysis is based on structural vector autoregression (SVAR) models proposed by Sims (1980). Two types of SVAR models are developed. The first is derived from the Blanchard and Quah (1989) model and assumes long-term restrictions to innovations using the economic theory. The second is known as an AB model (Breitung et al. 2004) and deals with short-term restrictions. The study employs the latter:

$$Ay_t = A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + B\varepsilon_t, \tag{1}$$

where: y_t contains the vector of variables, $\varepsilon_t \sim (0, I_k)$; A is a $k \times k$ invertible matrix of structural coefficients, which describes the contemporaneous relationships between the variables in y_t; A_i ($i = 1, 2, \ldots, p$) are $k \times k$ coefficient matrices describing dynamic interactions between the k-variables; and B is a ($k \times k$) matrix of structural coefficients representing the effects of k structural shocks. The reduced form of equation (1) can be obtained by pre-multiplying with the inverse of A:

$$y_t = A^*_1 y_{t-1} + A^*_2 y_{t-2} + \ldots + A^*_p y_{t-p} + u_t, \tag{2}$$

where: $A^*_i = A^{-1} A_i$, $u_t = A^{-1}B\varepsilon_t$, and $u_t \sim (0, \sum_u)$ is the symmetric variance--covariance matrix of the reduced form consisting of $k(k + 1)/2$ elements.

The reduced form model is difficult to understand without reference to a specific economic structure, and its parameters have no economic interpretations. In the case of structural models, identification focuses on the (orthogonal) errors of the system, which are interpreted as exogenous shocks. The structural VAR model (1) can be estimated based on the reduced form model (2) which, however, has fewer parameters. In this way at least $k^2 + k(k - 1)/2$ restrictions of the matrices A and B must be imposed to identify model (1) (Breitung et al. 2004). Most applications therefore consider special cases with $A = I_k$ (B models) or $B = I_k$ (A models). The necessary restrictions can be obtained from economic theory or from atheoretical rules, such as the "timing scheme" for shocks proposed by Sims (1980).

Impulse response analysis can be employed to analyse the dynamic interactions between the endogenous variables of VAR(p) models. Assuming that model (1) represents stationary (I(0)) process y_t, it has a Wold's moving average (MA) representation:

$$y_t = \Phi_0 u_t + \Phi_1 u_{t-1} + \Phi_2 u_{t-2} + \ldots, \tag{3}$$

where $\Phi_0 = I_K$ and Φ_s are computed recursively. The (i, j) element of the matrix Φ_s, considered as a function of s, measures the expected response of $y_{i, t + s}$ to a unit change in innovations $u_{j, t}$. The variance decomposition of forecast errors is another useful interpretation of the SVAR model. To obtain it, it is sufficient to notice, using (3), that forecast variance $y_{T + s}$ is expressed as:

$$\sum_s = Var(y_{T+s}) = \sum_{m=0}^{s-1} \Phi_m \Phi'_m. \tag{4}$$

The diagonal element of $\sum_s$ describes the variance of forecast error as the sum of the errors resulting from individual structural shocks.

3. Data

The relationships between commodity prices, the real economy and financial indicators in the euro area are explored by reference to monthly data from the period January 1997–December 2013. The analysis is based on five series of variables. The first is the industrial production index (IP) in the euro area, which describes the real economy in Europe. The second is the three-month euro-area interest rate (IR), which describes the financial economy. The data for both variables are taken from the Eurostat database. The third variable is the real exchange rate (REX). The remaining two variables are the commodity price indexes, that is, the energy price index (PEN) and the non-energy commodity price index (PNEN). The data for these variables are taken from the World Bank database. The energy price index (world trade-base weights) consists of crude oil (84.6%), natural gas (10.8%) and coal (4.6%). The non-energy price index consists of metals (31.6%), fertilisers (3.6%) and agriculture (64.8%). A detailed description of the variables is provided in Table 1, and basic descriptive statistics can be found in Table 2. All of the series are then expressed as indices (so that their average values in 2010 are equal to 100), seasonally adjusted and specified in natural logarithms.

The sample period is divided into three sub-periods. The first covers January 1997–December 2002, the second January 2003–December 2008 and the third January 2009–December 2013. The first, January 1997–December 2002, contains 72 observations. With a mean value of 96.41, the industrial production index – and euro area economic activity – is at its lowest in this period. The prices of energy sources and non-energy sources are also at their lowest in this period, while interest rates are at their highest

with a mean of 1.99 and a median of 2.20. The energy price index increases by 5.5% and the non-energy price index decreases by 29.2% in the first sub-period.

Table 1. The Dataset – Description of Variables

Variable	Full name	Description	Source
IP	the industrial production index in the euro area	euro area 17 (fixed composition) – Industrial Production Index, Total Industry (excluding construction) – NACE Rev2; Eurostat; Working day and seasonally adjusted	Eurostat
IR	the three-month interest rate in the euro area	nominal interest rate (NIR) minus HICP inflation: $100[\ln(1 + NIR_t) - (\ln HICP_t - \ln HICP_{t-12})]$	Eurostat
REX	the real exchange rate	index of nominal exchange rate (end of month), NER, adjusted by consumer price indexes in the US and euro area: $100 \cdot NER \cdot CPI_{US} / HICP_{EA}$, 2010 = 100	Eurostat, Federal Reserve Bank of St Louis
PEN	the energy price index	monthly index based on nominal US dollars deflated with CPIUS, 2010 = 100	World Bank, Federal Reserve Bank of St Louis
PNEN	the non-energy price index	monthly index based on nominal US dollars deflated with CPIUS, 2010 = 100	World Bank, Federal Reserve Bank of St Louis

Source: authors' own compilation.

Table 2. Descriptive Statistics

	IP	IR	REX	PEN	PNEN
Mean	100.60	0.73	109.60	75.20	77.65
Median	100.46	0.93	104.84	70.01	73.38
Maximum	114.68	2.99	152.58	175.64	127.20
Minimum	87.45	–2.32	83.77	20.16	47.54
Std. Dev.	5.79	1.42	16.34	37.05	22.05
Skewness	0.29	–0.31	0.99	0.35	0.47
Kurtosis	2.97	2.01	3.14	2.05	1.99

Source: authors' own calculations.

The second sub-period, January 2003–December 2008, contains 72 observations. The energy price index increases by 28.5% and the non-

-energy price index increases by 32.2% in this period. The euro zone economy is then at its most active, which is demonstrated by the highest values for the industrial production index, which has a mean value of 105.68. With a mean of 0.72 and a median of 0.36, the interest rates are lower than in the first period.

In the final sub-period, January 2009–December 2013, the mean and the median of the real interest rates are negative at –0.84 and –1.05 respectively. The values displayed by the industrial production index, whose mean value is 99.55, are only slightly higher than in the first sub-period, and much lower than in the second sub-period. The energy price index increases by 78.4% and the non-energy price index increases by 16.5% in the final sub-period.

4. Empirical Results

4.1. Time Series Properties of the Data

A preliminary analysis of the series is carried out before estimating the main model. The standard augmented ADF unit root tests (Dickey & Fuller 1979) for both the intercept and the trend specifications demonstrate that all of the variables have unit roots for each sub-period analysed. The number of lags in the test is established using the AIC criterion. The ADF unit root test confirmed that all of the variables are integrated of an order of one, i.e. I(1), thus making the test for cointegration justified. The test results are presented in Table 3.

Table 3. Unit Root Test Results for each Sub-period

Sub-period	Variable	Level		First difference	
		intercept	intercept and trend	intercept	intercept and trend
1997:1–2002:12	IP	–2.7232	–1.6266	–11.6381***	–12.1336***
	IR	–0.6207	–2.5671	–7.3601***	–7.3496***
	REX	–1.4755	–0.1782	–7.0423***	–7.2472***
	PEN	–1.3676	–1.5073	–6.0474***	–5.9651***
	PNEN	–0.9121	–1.3533	–7.4002***	–7.3506***
2003:1–2008:12	IP	–1.1568	–1.0029	–11.9064***	–11.9143***
	IR	–1.0186	–1.8155	–7.4128***	–7.3509***
	REX	–2.3057	–2.4251	–8.4422***	–8.4539***
	PEN	–1.1136	–2.0591	–8.4195***	–8.3045***
	PNEN	–0.5708	–2.7851	–8.6750***	–8.5870***

Table 3 cnt'd

Sub-period	Variable	Level		First difference	
		intercept	intercept and trend	intercept	intercept and trend
2009:1–2013:12	*IP*	–2.3250	–2.3984	–4.1896***	–4.0177***
	IR	–2.4061	–1.0401	–6.9393***	–7.4423***
	REX	–2.5147	–2.7323	–8.5349***	–8.4427***
	PEN	–2.2888	–1.3825	–12.8698***	–13.1621***
	PNEN	–2.2941	–0.5975	–11.2026***	–12.2130***

Note: All variables in natural logs, lag lengths are determined via AIC; (***) indicates the rejection of unit root at 1%.

Source: authors' own calculations.

Table 4. Test for Cointegration (with Intercept in the CE) for each Sub-period

Sub-period	Hypothesised no. of CE(s)	Trace statistic		Max-Eigenvalue statistic	
		test statistic	critical value 0.05	test statistic	critical value 0.05
1997:1–2002:12	none	68.040	69.819	26.663	33.877
	at most 1	41.377	47.856	19.853	27.584
	at most 2	21.523	29.797	16.327	21.132
	at most 3	5.196	15.495	3.927	14.265
	at most 4	1.269	3.841	1.269	3.841
2003:1–2008:12	none	70.654**	69.819	33.429	33.877
	at most 1	37.224	47.856	19.530	27.584
	at most 2	17.694	29.797	9.473	21.132
	at most 3	8.221	15.495	7.321	14.265
	at most 4	0.899	3.841	0.899	3.841
2009:1–2013:12	none	69.481	69.819	27.062	33.877
	at most 1	42.418	47.856	21.293	27.584
	at most 2	21.125	29.797	12.239	21.132
	at most 3	8.886	15.495	8.740	14.265
	at most 4	0.147	3.841	0.147	3.841

Note: (**) indicates statistical significance at the 5% level.

Source: authors' own calculations.

The investigation then turns to the presence of a long-term relationship between the integrated variables. The trace test statistic

proposed by Johansen and Juselius (1990) is employed to detect this relationship. If the variables are cointegrated, which suggests a long-term relationship, simply differencing them is inappropriate and will result in a misspecification. Table 4 presents the results of the Johansen cointegration test. The Johansen maximum likelihood approach, which employs both maximum eigenvalue and trace statistics, is used to test cointegration. While no cointegration at the 5% level is detected in the first and third sub-periods the test does find evidence of cointegration in the second sub-period. The trace test indicates a single cointegrating equation at the 0.05 level. In contrast, the maximum eigenvalue test indicates no cointegration at the 0.05 level[1]. Since the results of the cointegration tests are at best ambiguous and at worst suggest no cointegration whatsoever, and the variables are integrated of an order of one I(1), we employ a VAR for the first differences in our five variables.

The number of VAR lags for each sub-period is established using the AIC criterion. The lag length is one for the first and second sub-periods and two for the third sub-period.

4.2. Structural Impulse Response Analysis

We employ the Choleski decomposition of the reduced form and assume that A is an identity matrix, while B is a lower triangular matrix, to identify the SVAR model. To identify the shocks, we order the variables in the VAR models, and thereby the corresponding shocks (ΔIP, ΔIR, ΔREX, ΔPEN, $\Delta PNEN$).

$$B\varepsilon = \begin{bmatrix} * & 0 & 0 & 0 & 0 \\ * & * & 0 & 0 & 0 \\ * & * & * & 0 & 0 \\ * & * & * & * & 0 \\ * & * & * & * & * \end{bmatrix} \begin{bmatrix} \varepsilon_{IP} \\ \varepsilon_{IR} \\ \varepsilon_{REX} \\ \varepsilon_{PEN} \\ \varepsilon_{PNEN} \end{bmatrix}, \tag{5}$$

where: B is a lower diagonal matrix consistent with the Choleski decomposition, the "*" entries in the matrix represent unrestricted parameter values and the zeroes suggest that the associated fundamental shock does not contemporaneously affect the corresponding endogenous variable.

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[1] Since the sample was short, and there were five series in a vector of interests, a Monte Carlo experiment was performed and the empirical critical values of the trace test were determined. Following the test, we found that the null hypothesis of no cointegration was rejected too often.

A five-variable VAR is estimated for changes in industrial production (ΔIP), the real interest rate (ΔIR), the real exchange rate (ΔREX), the real energy price index (ΔPEN) and the real non-energy price index ($\Delta PNEN$). The ordering of variables is implied by economic theory and the objective of this study, which is to capture the reactions of commodity prices to all of the other variables. It is for this reason that the commodity prices are placed at the end. A similar ordering is applied by Akram (2009). Because it adjusts sluggishly to shocks, industrial production is supposed to be the least responsive variable, which is why it is selected as the first variable in the VAR. The decision to position the interest rate before the exchange rate, which is nevertheless in accord with the ordering applied by Arora and Tanner (2013), is of secondary importance since the focus falls on commodity prices.

The impulse response results for structural, one-standard deviation innovations in the industrial production index, the real interest rate, the real exchange rate, the energy price index and the non-energy price index are illustrated in Figures 1–3 for each sub-period respectively. For example, the impulse response of each variable in the system to an innovation in the industrial production index in the first sub-period is shown in the first column of Figure 1 with a solid line. The dashed lines correspond to plus or minus two standard errors around the impulse responses.

The output shocks in the sub-period January 1997–December 2002 were mostly neutral for all variables except the real interest rate. The latter's response was consistent with our intuition: as the economy expanded driven by the positive production shock, the interest rate increased. Since positive shocks can trigger inflation, this might also have been accompanied by changes in the policy rate.

Shocks to the real interest rate prompted a negative reaction from the energy price index, which is consistent with Hotelling's rule, which states that the gain made from storing a commodity should be equal to the interest rate. The gain includes a revaluation gain and a convenience yield and is adjusted downwards by storage cost and risk premium (see Frankel & Rose 2010 or Śmiech et al. 2014). That energy prices react in this way to the interest rate demonstrates their similarity to asset prices (Svensson 2008).

The real depreciation of the United States dollar exerts a positive impact on both commodity prices, which is a connection that has been identified by other scholars, such as Akram (2009). This can be explained as follows: if commodity prices are quoted in United States dollars, which they are, and this currency depreciates, commodity prices will fall when they are expressed
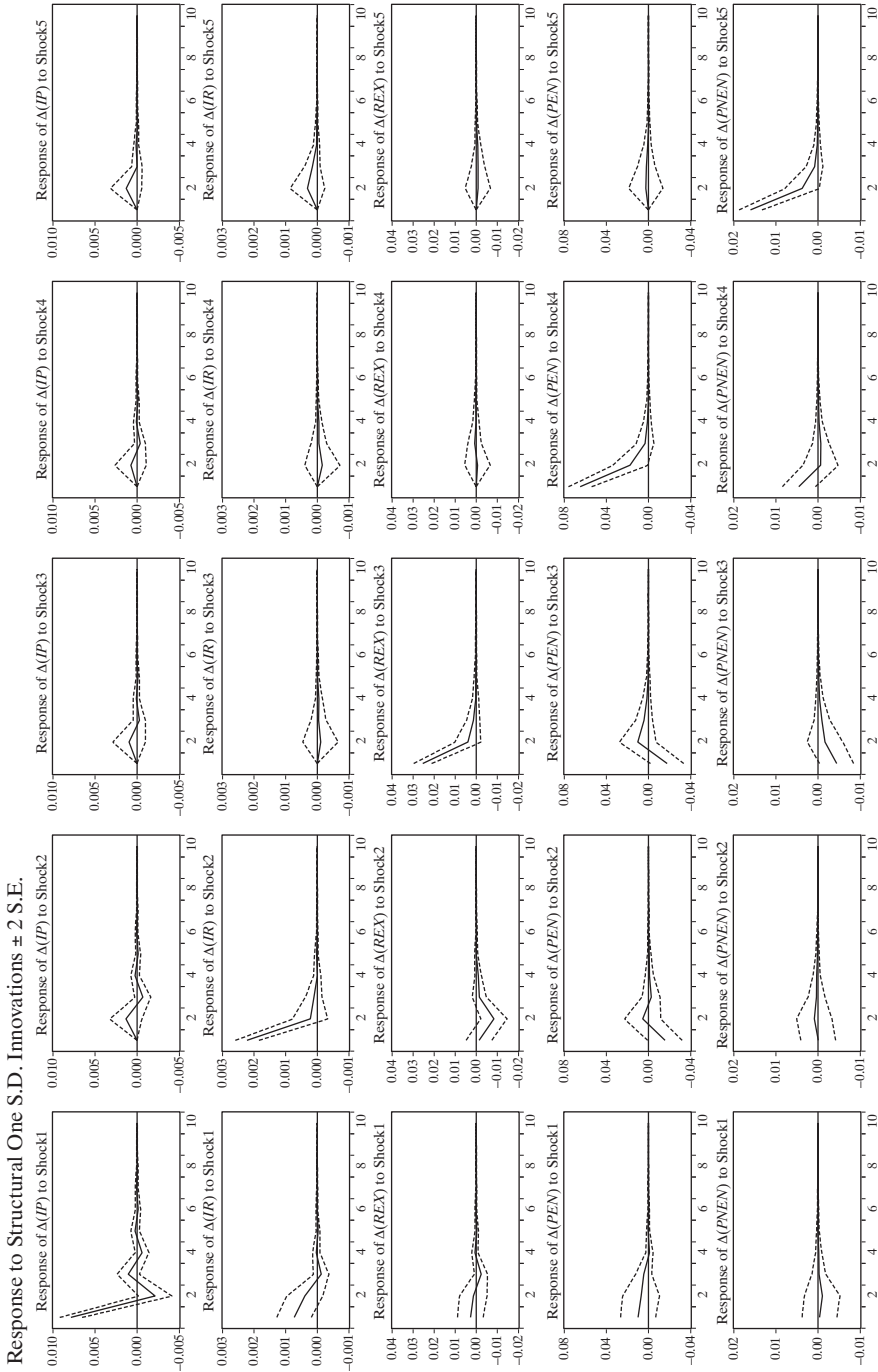
Fig. 1. The Impulse Responses Results in the Sub-period 1997:1–2002:12

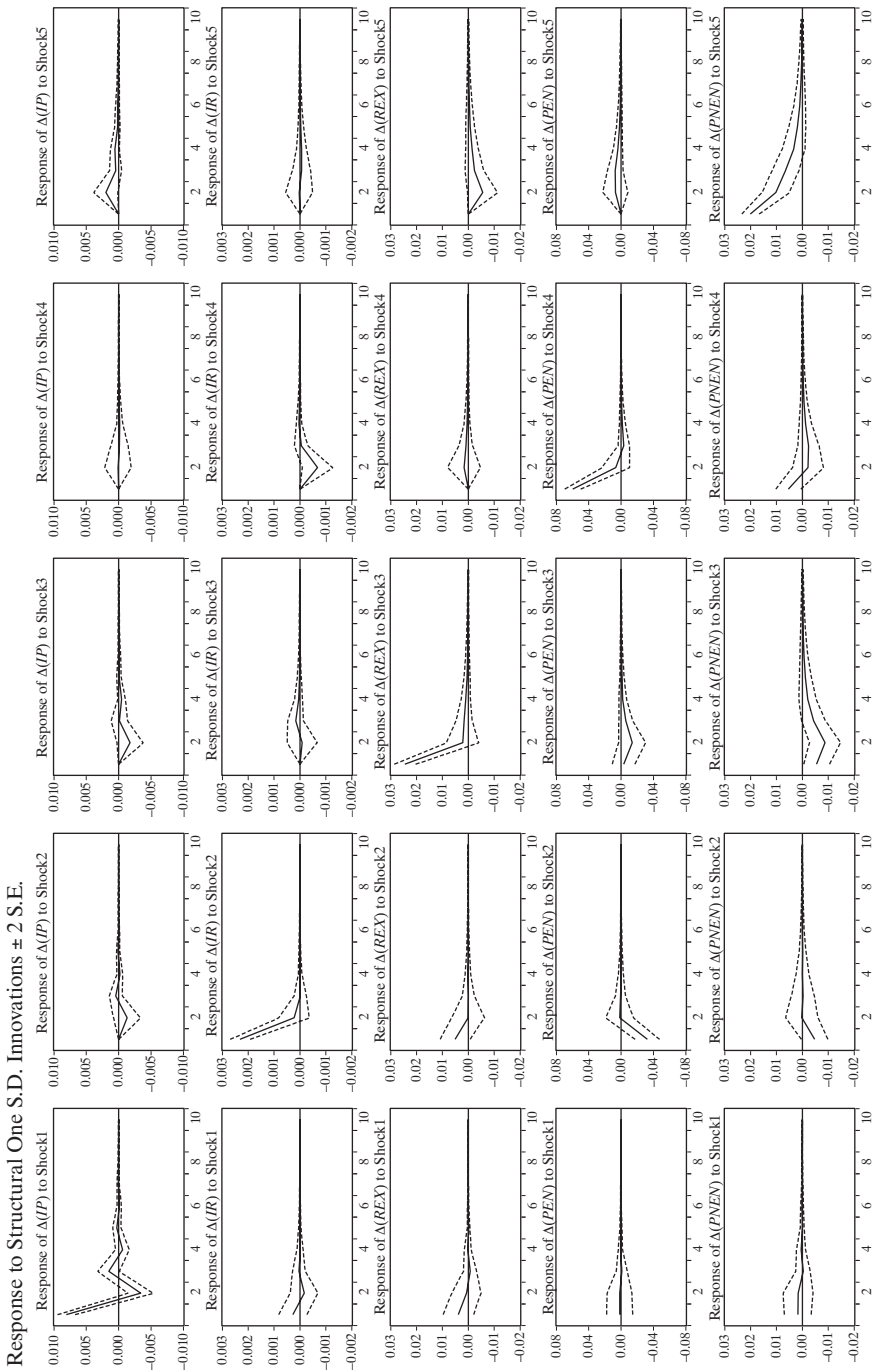Source: authors' own calculations.

Fig. 2. The Impulse Responses Results in the Sub-period 2003:1–2008:12
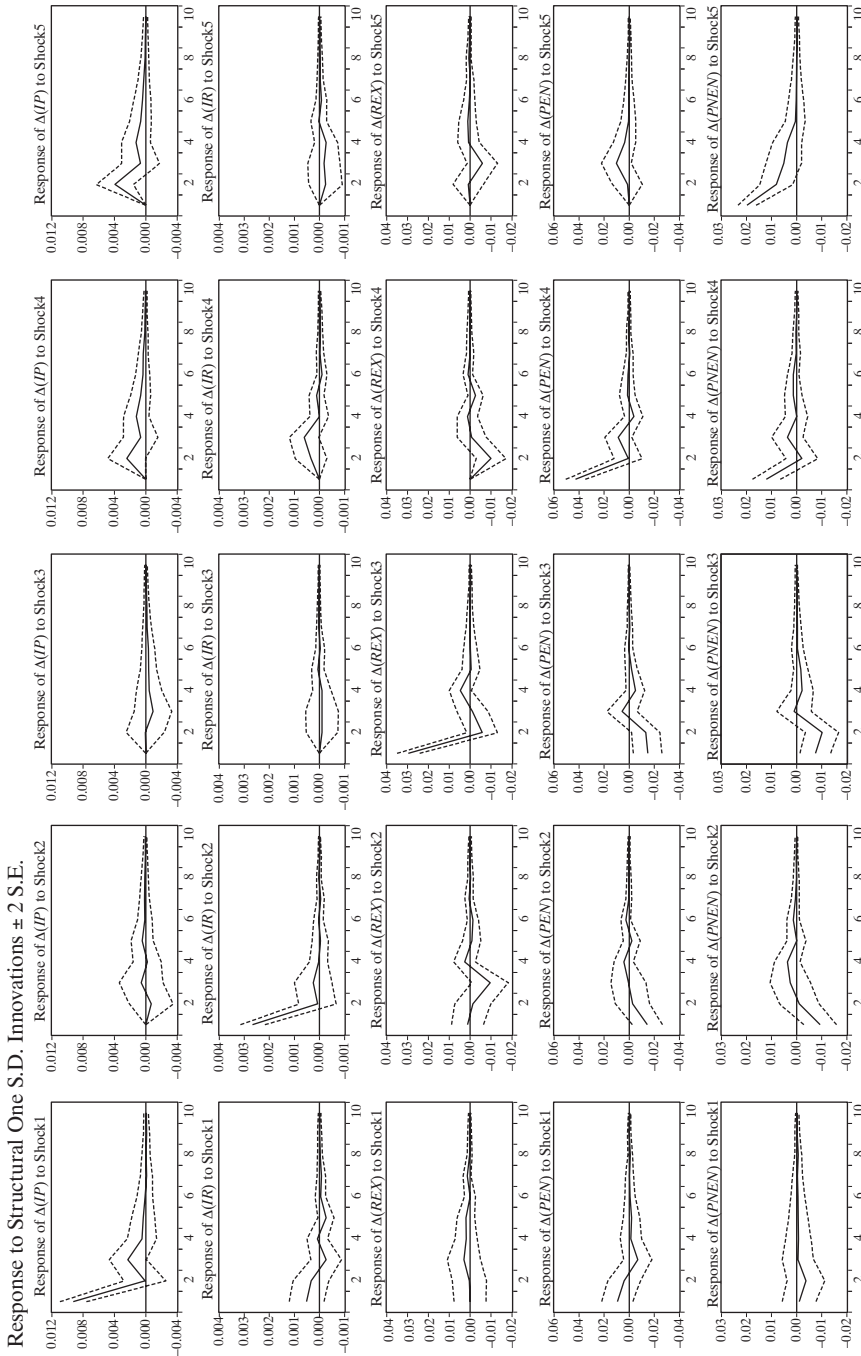
Source: authors' own calculations.

Fig. 3. The Impulse Responses Results in the Sub-period 2009:1–2013:12

Source: authors' own calculations.

in other currencies. The demand for commodities will then increase, which results in a higher dollar price for commodities and some reversal of the initial depreciation of the United States dollar.

The non-energy price index makes a significant and positive response to shocks in energy prices. Both commodities could thus be seen as related to each other. In other words, non-energy prices could not deviate too much from energy prices.

Figure 2 illustrates the impulse response functions for the January 2003–December 2008 sub-period. Two differences are visible when they are compared with responses in the first sub-period. First, interest rate shocks are much more important not only for energy prices but also for non-energy prices. It would appear that commodity prices behaved more like price assets in the period preceding the global financial crisis. At the same time, the link running from the real exchange rate to the energy-price rate, and from industrial production to the real interest rate, ceased to be significant, which suggests that financial processes became detached from the real economy. Second, the exchange rate responds positively to shocks in the interest rate. This looks like an anomaly because a higher euro-area interest rate should make the euro stronger and the United States dollar weaker (a negative response), whereas the response functions suggest the opposite.

The January 2009–December 2013 sub-period is a mixture of the features of the previous two. As in the middle period (January 2003–December 2008), the interest rate remains unrelated to output shocks, but the real exchange rate does not behave anomalously in response to interest rate shocks. Both commodity prices respond to interest rate shocks and exchange rate shocks as the theory suggests they should. It is interesting to note that non-energy prices respond more strongly to shocks in energy prices than in the other two sub-periods.

4.3. Variance Decomposition

The forecast error variance decompositions of changes in commodity price indexes at four time horizons (1, 3, 6 and 12 months), and across three sub-periods, are presented in Tables 5a and 5b[2]. Shocks within their own indexes account for 50%–85% of the forecast error variance for both commodity price indexes, though their contribution fell over time.

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[2] The results for longer time horizons did not differ from those for twelve-month horizons. The variance decompositions for changes in industrial production, the interest rate and the real exchange rate are available on request.

In the first sub-period, interest rate and exchange rate shocks make higher contributions to fluctuations in the energy price index than output shocks. This dominance is even stronger in the middle sub-period when the link to the interest rate was the prevailing feature. The contributions are more balanced in the final sub-period when exchange rate shocks are slightly more dominant.

Table 5a. Variance Decomposition of the Energy Price Index Δ*PEN* for each Sub-period

Sub-period	Horizon (in months)	Shock in:				
		Δ*IP*	Δ*IR*	Δ*REX*	Δ*PEN*	Δ*PNEN*
1997:1–2002:12	1	1.99	5.01	6.39	86.61	0.00
	3	3.05	5.16	7.92	83.68	0.18
	6	3.06	5.18	7.96	83.60	0.20
	12	3.06	5.18	7.96	83.59	0.20
2003:1–2008:12	1	0.06	22.88	0.21	76.85	0.00
	3	0.14	21.20	4.63	72.09	1.93
	6	0.15	21.08	4.73	71.74	2.31
	12	0.15	21.07	4.73	71.73	2.32
2009:1–2013:12	1	3.78	8.97	9.30	77.96	0.00
	3	5.41	7.76	15.07	67.93	3.82
	6	5.44	8.56	15.55	66.26	4.18
	12	5.48	8.56	15.55	66.23	4.19

Source: authors' own calculations.

Table 5b. Variance Decomposition of the Non-energy Price Index Δ*PNEN* for each Sub-period

Sub-period	Horizon (in months)	Shock in:				
		Δ*IP*	Δ*IR*	Δ*REX*	Δ*PEN*	Δ*PNEN*
1997:1–2002:12	1	0.05	0.00	6.54	6.96	86.44
	3	0.39	0.28	7.26	6.76	85.31
	6	0.40	0.32	7.30	6.77	85.21
	12	0.40	0.32	7.30	6.77	85.21
2003:1–2008:12	1	0.61	4.62	6.22	5.95	82.59
	3	0.77	3.04	16.98	5.30	73.91
	6	0.77	2.95	17.23	5.40	73.65
	12	0.77	2.94	17.24	5.40	73.64

Table 5b cnt'd

Sub-period	Horizon (in months)	Shock in:				
		ΔIP	ΔIR	ΔREX	ΔPEN	$\Delta PNEN$
2009:1–2013:12	1	0.16	12.89	8.22	21.30	57.44
	3	1.70	10.38	17.52	17.79	52.61
	6	1.76	11.54	17.57	17.36	51.77
	12	1.84	11.55	17.56	17.34	51.70

Source: authors' own calculations.

The forecast error variance decompositions of changes in the non-energy price index show that the importance of all shocks increased over time. This is especially true for interest rate shocks, whose contribution was initially less than 1% but increases to more than 10%.

The final observation to make in this section is that the links between commodity prices grew closer as time passed. In this way the contribution of non-energy price shocks to the variance in the energy price index increases from approximately zero to 4%, while the contribution of energy price shocks to the variance in the non-energy price index rises from 7% to 17%. The closer link could be explained by the rising importance of biofuels in the non-energy price index (see Demirbas 2011) and/or the heightened interest of investors in financial markets for non-energy commodities. The former has the effect of making non-energy commodities similar to energy commodities, while the latter renders them similar to financial assets.

5. Conclusion

The euro area is a large open economy whose real and financial developments have the potential to exert a considerable impact on commodity prices. The structural VAR model for three sub-periods has been employed to check whether this relationship holds. The first major finding is that economic activity in the euro area is mostly neutral for commodity prices.

The second major finding is that the same could not be said of the real interest rate and the exchange rate. Energy prices and non-energy prices respond to shocks in the real interest rate in all sub-periods, and the link grows particularly strong in the period preceding the global financial crisis. Real exchange rate shocks gain in importance in the period following the crisis, that is, in the final sub-period of January 2009–December 2013. Even

though these relationships accord with the standard model of commodity price determination (Frankel & Rose 2010; Śmiech et al. 2014, for example), the model itself does not imply that financial factors should dominate real processes. However, this is precisely how they behave in the period preceding the global financial crisis.

The third and final major finding is that the relationships between energy commodity prices and non-energy commodity prices became stronger over time. Non-energy commodities, in that they are more sensitive to changes in the interest rate and energy prices, have grown to resemble financial assets.

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Abstract

Wpływ makrogospodarki strefy euro na światowe ceny surowców

Celem artykułu jest zbadanie wzajemnych powiązań pomiędzy sferą realną i finansową gospodarki strefy euro a cenami surowców energetycznych i nieenergetycznych. Analizy oparto na danych miesięcznych obejmujących okres od stycznia 1997 r. do

grudnia 2013 r., zaś wzajemne relacje zostały wyjaśnione za pomocą strukturalnego modelu wektorowej autoregresji SVAR. Analiza została przeprowadzona dla trzech podokresów, co miało umożliwić wykrycie potencjalnych zmian relacji. W wyniku badań ustalono, że ceny surowców nie reagowały na wstrząsy aktywności ekonomicznej, natomiast pozostawały pod silnym wpływem procesów finansowych, zwłaszcza w okresie poprzedzającym światowy kryzys finansowy. Badanie wykazało także, że umocniły się relacje pomiędzy cenami surowców energetycznych i nieenergetycznych.

Słowa kluczowe: ceny surowców, sfera realna gospodarki, sfera finansowa, strukturalny model wektorowej autoregresji.

Anna Malinowska

THE IMPACT OF THE MONETARY-FISCAL POLICY MIX AND FINANCIALISATION ON FIXED ASSET INVESTMENT IN THE EU IN 1999–2014

Abstract

This paper explores the combined impact of tight monetary policy, government debt, budgetary deficit, financialisation, and financial leverage on the fixed asset investment (FAI) of non-financial private firms in EU countries in the 1999–2014 period. I estimate eight static fixed-effects models and test for six hypotheses. While inconclusive regarding the combined impact of tight monetary policy and government debt, the results suggest that the influence of monetary policy was limited only to the euro area, suggesting that national monetary policies were inconsequential with regard to changes in FAI. Despite the detrimental effects of financialisation, the findings highlight that cash flows generated from the sector's financial assets might serve as an internal source of FAI funding that strongly correlates with monetary contractions. The findings also highlight the possibility of an active balance sheet channel. However, given the macro-level character of the data, further research on the micro-level might provide more insight into specific issues.

1. Introduction

Investment is one of the main determinants of economic growth. The global financial crisis and the ensuing fiscal crisis that hit the EU countries has forced academics and policymakers to rethink the impact of government

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debt and monetary policy on the dynamics of non-financial firms' fixed asset investment (FAI). The increasing dependence of non-financial corporations on earnings through financial channels, rising financial asset ratios, and unrestrained inter-country capital flows within and beyond the European Monetary Union (EMU) have made modern financial systems more prone to instability, raised the risk of systemic crises, and postponed economic recovery.

This paper investigates the combined impact of monetary policy, government finance, and financialisation on the FAI levels of non-financial corporations in thirty European economies in 1999–2014. Whereas prominent theoretical works of the 1960s, such as those of Modigliani (1961) and Diamond (1965), suggested that high government debt has a negative impact on economic growth, recent research (Corsetti et al. 2010; Checherita & Rother 2010; Kumar & Woo 2015) has been inconclusive. The impact of monetary policy on FAI has been less ambiguous: investment falls in periods of restrictive monetary policy (Bernanke & Gilchrist 1996; Peersman & Smets 2002; Angelopoulou & Gibson 2009; Masuda 2015). Recent studies of financialisation (Rossi 2007, 2013; Rossi & Dafflon 2012; Alvarez 2015) have argued that this process has increased the sensitivity of the economy and made it more prone to systemic shocks and to reduced fixed asset investment.

The influence of monetary policy on FAI in the selected timeframe was debatable. While the influence of the decisions made by the European Central Bank (ECB) was in line with the hypothesis, the policies of national banks beyond the euro area seemed of little consequence. Though financialisation can be regarded as a prospective internal source of finance for new investment, it is also capable of generating losses and slowing investment. The research is inconclusive regarding the impact of the combined influence of tight monetary policy and government debt. The empirical results suggested that this relationship exists but further research is needed.

Section 2 below reviews the relevant literature, Section 3 explains the hypotheses, and Section 4 describes the construction of the variables. Section 5 presents the empirical results and discusses their significance, while Section 6 clarifies them by means of a robustness check. The various strands of the paper are then drawn together in a conclusion.

2. Literature Review

I make the assumption that investment falls in periods of tight monetary policy but does so far more sharply in the case of companies operating under exacting financial constraints. This assumption formed a base for extensive research regarding the US economy, the majority of which focused on the relationship between credit and output (Bernanke & Gertler 1995; Gertler & Gilchrist 1994). The findings of Chatelain, Generale, Hernando, von Kalckreuth and Vermeulen (2003) implied that shifts in monetary policy impacted investment primarily through interest rates and credit channels. The sensitivity of investment to liquidity was more pronounced in periods of tight monetary policy. Peersman and Smets (2002) suggested that the greater impact of monetary policy tightening in periods of recession compared to economic booms was caused by asymmetries in monetary policy transmission. The sources of these asymmetries included differences in the financing structure of companies, in the maturity of their debts, in the level of their financial leverage and in their size. Bougheas, Mizen and Yalcin's (2006) investigations concentrated on the balance sheet channel of monetary policy transmission. They demonstrated that firm-specific characteristics determined a company's financing and debt structures and that, in accordance with the hypothesis, these changed in periods of tight monetary policy.

Stawska (2012) analysed the impact of the policy mix on economic growth approximated by investment in the period of the financial crisis in the euro area. She argued that gross investment fell significantly despite monetary expansion and high government spending. Stawska associates this observation primarily with raised stress and risk levels in the euro area financial markets and not with the failures of policy makers.

Public debt has an important impact on economic growth both in the short and long terms. There are at least five channels through which raised government debt can affect capital accumulation and production: higher interest rates, sovereign risk spillovers to the private sector causing higher borrowing costs (Baldacci & Kumar 2010), lower future infrastructure spending, rising inflation (Cochrane 2011) and diminishing investor confidence. The theoretical work of Modigliani (1961), Diamond (1965) and Saint-Paul (1992), which are based on the neoclassical growth model, suggested that government debt is likely to slow economic growth. Corsetti et al. (2010) stressed the need to eliminate fiscal imbalances and reduce government debt – particularly if the impact of monetary policy is limited

due to an inoperative interest rate channel. Writing before the fiscal crisis, Schclarek (2004) claimed that the impact of government debt depends on the maturity of the economy in question. He argued that raised levels of government debt hinder economic growth in the case of emerging markets, but found this relationship to be unclear in the case of advanced economies. Checherita and Rother (2010) suggested that where government debt exceeds 90% of GDP its influence on economic growth turns non-linear. Baum, Checherita and Rother (2013), meanwhile, reported that the short--term impact of government debt on economic growth was positive if it did not exceed 67% of GDP, which was the point at which the variable lost statistical significance. Furthermore, they stated, debt ratios of over 95% hinder economic activity. Kumar and Woo argued that high initial debt had inverse effects on long-run economic growth and that negative, non-linear effects could not be excluded if debt exceeded 90% of GDP (Kumar & Woo 2015, p. 731). The results returned by Spilioti and Vamvoukas (2015) implied that government debt correlated positively with economic activity as long as it did not exceed 110% of GDP. Dar and Amirkhalkhali (2002) based their study on the TFP (Total Factor Productivity) measure and capital productivity as approximations for economic growth and proved that both were lower in countries where government, measured by debt-to-GDP ratio, was larger. Alfonso and Jalles (2013) used the TFP approach to argue that raised debt lowers output. They discovered that higher government debt correlated positively with economic growth as measured by TFP, but had a negative impact on public and private sector investment.

Financialisation embraces a broad range of processes and thus eludes a single definition. Epstein (2005) equated it with the growing importance of financial markets, financial institutions and financial motives in the operation of both domestic and international economies. Modern economies have become more sensitive to disruptions in the wake of the liberalisation, deregulation and growing integration of the real and financial sectors (van Treck 2009). This could be seen in the USA in the 1980s and later in Europe, especially in France, Germany and the UK. Krippner (2005) defined financialisation as a process in which profits are made through financial channels rather than trade and commodity production. That unlimited sums of capital can be transferred risk free in the form of bank deposits from countries with low rates of return to those where the expected profits are higher, has hindered stabilisation and convergence and highlighted economic imbalances between the core of the euro area and its periphery (Rossi 2007). Market liberalisation has increased the tendency

to maximise shareholder value and shifted the focus from balanced, long--term growth to short-term profit and increasing the share price. Companies pursue more short-term investments to achieve this, but at the long-run risk of creating a price bubble and making the economy even more sensitive (Rossi 2013, p. 389).

Referring to emerging markets, F. Demir (2008) claimed that profits and the rate of return on assets had an impact on FAI in the non-financial private companies and suggested that easier access to alternative and financial markets offered investors the opportunity to redirect profits and savings from FAI to short term-financial investments. The consequence, he argued, could be the deindustrialisation of emerging economies. Writing more recently, Alvarez (2015) has stressed with reference to advanced economies that financialisation has increased the dependence of French non-financial firms on profits from financial operations as opposed to those from trade and production.

3. Hypotheses

This article investigates the combined impact of restrictive monetary policy, government finance, and the level of financialisation at non-financial private companies on the FAI of non-financial firms. Four basic and two auxiliary hypotheses have been formulated based on the literature review. Each of them tests the influence of one of the parameters on the dependent variable in the chosen timeframe.

The first hypothesis (H1) introduces variables describing the monetary policy of the ECB, or one of the national central banks if the country in question does not belong to the EMU.

H1: The tightening of monetary policy reduces the fixed asset investment of non-financial companies.

It is the view of Rossi (2007, 2013) that financialisation in its various forms has been detrimental to financial stability and economic growth, while Alvarez (2015), Krippner (2005), and Ząbkowicz (2009) have stressed the growing share of earnings obtained through financial channels by non--financial corporations. Because of limited access to comparable firm--level data for the chosen period and countries, the level of financialisation has been measured in a different way: as a ratio of financial assets to the total assets of the non-financial sector. This makes it possible to control for the financial risk of the sector, which is associated with, but not limited to, exchange rate and interest rate fluctuations, which induce changes in

financial asset prices. Potential gains through this channel are viewed in this paper as an alternative source of funding for FAI. Conversely, losses incurred will reduce available funds and have an unfavourable impact on investment decisions.

H2: The level of financialisation, as measured by the financial assets to total assets ratio of the non-financial firms, has a positive impact on FAI.

Depending on the variety of financial assets held by the non-financial sector, the tightening of monetary policy may cause the variable to either lose its positive influence and become statistically insignificant or have a negative impact on investment decisions. Growing financing costs, or losses incurred when the prices of financial assets change following shifts in monetary policy, may absorb funds which were originally meant to finance new investment but needed to be redirected to buffer immediate losses. This is reflected in the following hypothesis.

H2A: The tightening of monetary policy reverses this influence and may lower FAI.

Were H2A true, it would imply the existence of the credit channel of monetary policy transmission in the chosen timeframe.

Hypotheses H3 and H4 test the impact of government finance on FAI. Based on the relevant literature and empirical data, it is expected that where levels of either government debt or deficit are considered too high they are likely to constrain economic growth.

H3: Government debt constrains the FAI of private sector non-financial firms.

H3A: This hypothesis combines government debt and monetary policy and states that the negative impact of government debt on FAI is stronger when coupled with tight monetary policy.

It is assumed that the coefficient of the relevant cross-term will be greater than that of the government debt variable.

Hypothesis H4 tests the relationship with regard to budgetary deficit or surplus. It is assumed that the former will lower FAI while the latter could have a favourable impact and cause it to rise.

H4: Budget deficits have a negative influence on the investment decisions of non-financial private companies.

Hypotheses H2 and H2A test the influence of the collective balance sheet structure of the non-financial private sector firms. Theoretically, shifts in monetary policy influence both assets and liabilities via the balance sheet channel and change the values of these assets and liabilities accordingly.

4. Data

The data regarding country-specific indicators, such as fiscal situation, real economic activity, capitalisation of the domestic market, gross profit and fixed asset investment at non-financial private sector companies were provided by Eurostat and the OECD Complete Database of Main Economic Indicators. The databases managed by the ECB, the Federal Reserve Bank of St. Louis, the National Bank of Bulgaria, the Bank of Latvia, the Bank of Lithuania, the Central Bank of Norway, the Bank of England, the Czech Central Bank, the World Bank, the Swiss National Bank, the Romanian National Bank and the Stooq data archives provided the information needed to construct the monetary policy variable (see equations (1) and (2), which was later replaced by the three-month interbank offered rate. The panel model was estimated in four steps, so that new variables were introduced gradually. Overall, I used nine explanatory variables, three of which were cross-terms. The level of fixed asset investment (FAI) at non-financial private sector firms was expressed relative to GDP.

The monetary policy variables were constructed based on the monthly monetary-policy decisions issued by the central banks in 1999–2014 (Angeloupoulou & Gibson 2009 p. 679; Masuda 2015, p. 13). As more countries entered the euro area, the ECB assumed responsibility for making the decisions previously handled by the national central banks. The monthly binary variable shown in equation (3) was constructed:

$$MP\_MONTHLY_{i,t} = \begin{cases} 0 - \text{all other decisions} \\ 1 - \text{monetary policy tightening} \end{cases}, \qquad (1)$$

where i and t denote the country i in the year t. These variables were then annualised according to equation (4) (Masuda 2015, p. 13):

$$NMP_{i,t} = \frac{\sum_1^{12} MP\_MONTHLY_{i,t}}{12}, \qquad (2)$$

where $NMP_{i,t}$ takes a value between 0 and 1 for country i in the year t.

Both Krippner (2004, p. 174) and Ząbkiewicz (2009, p. 28) proposed measuring financialisation as the level of financial profits of non-financial corporations relative to their operational profits. This approach would require firm-level data from a representative number of companies in the non-financial sector in each of the thirty economies included in the sample. Even if it were possible to obtain, the comparability of this data would be limited due to differing accounting standards. Given that financialisation

is defined quite broadly in the literature discussed above, its level is approximated ($FIN_{i,t}$) for the whole sector in the i country in year t using the ratio of cash-flow-generating financial assets to the sector's total assets. There is an additional control for the total debt-to-equity ratio $(D/E)_{i,t}$.

The following variables describing a country's i fiscal situation in year t are included to verify hypotheses H3, H3A, and H4: budgetary surplus or deficit ($BUDGET_{i,t}$) relative to GDP and total government debt ($GOVDEBT_{i,t}$) relative to GDP. The former variable takes positive values for the surplus and negative for the deficit. Control for EU and EMU membership is provided by two binary variables constructed according to equations (1) and (2), respectively:

$$EU\_MEM_{i,t} = \begin{cases} 0 - \text{country does not belong to the EU} \\ 1 - \text{country belongs to the EU} \end{cases} \tag{3}$$

$$EMU_{i,t} = \begin{cases} 0 - \text{country does not belong to the euro area} \\ 1 - \text{country belongs to the euro area} \end{cases} \tag{4}$$

where i and t denote the country i in the year t.

The monetary policy variable $NMP_{i,t}$ (equation 1) served to construct three cross-terms:

– $(EMU \cdot NMP)_{i,t}$ captures the direct impact of the ECB's decisions on the euro area economies – in the case of countries not belonging to the EMU it takes a value of 0,

– $(GOVDEBT \cdot NMP)_{i,t}$ captures the impact of central bank decisions on government debt,

– $(FIN \cdot NMP)_{i,t}$ captures the impact of monetary policy on the financialisation measure and tests the existence of the balance sheet channel.

Two variables are introduced to control for the size of the capital market and fluctuations in the gross profit of non-financial corporations relative to GDP: $MARKETCAP_{i,t}$ and $GROSSPROFIT_{i,t}$.

The $NMP_{i,t}$ variable was replaced by the three-month interbank offered rate ($IBOR\ 3M_{i,t}$) in the robustness check. The three-month interbank offered rate approximates investors' and businesses' expectations regarding future monetary policy decisions: if the variable were statistically significant it would imply that the primary channel of monetary policy transmission to the real economy influenced FAI in the chosen timeframe.

5. Empirical Results

Based on the results of the Hausman test, the following equation (equation (5) below) was estimated using a fixed effects model. Lagged variables were used to control for possible lags in the impact of government debt and monetary policy transmission and to avoid endogeneity problems. Ideally, a GMM estimation would be employed. However, it was found by the Sargan test to be invalid for this paper.

$$FAI_{i,t} = MARKETCAP_{i,(t-1)} + GROSSPROFIT_{i,(t-1)} + (D/E)_{i,(t-1)} + FIN_{i,(t-1)} +$$
$$+ GOVDEBT_{i,(t-1)} + EUMEM_{i,t} + NMP_{i,(t-1)} + (EMU \cdot NMP)_{i,(t-1)} + \quad (5)$$
$$+ (FIN \cdot NMP)_{i,(t-1)} + (GOVDEBT \cdot NMP)_{i,(t-1)} + BUDGET_{i,(t-1)} + year_i + \varepsilon_{i,t}$$

The abbreviations are as explained in Section 4. The variable $year_i$ controls for other macroeconomic and political factors that were influencing a country's i economy but which were not included in equation (5). $\varepsilon_{i,t}$ is the disturbance term.

Table 1 below displays the results of the four-step estimation process.

The monetary policy stance of the national central banks, or the ECB in the case of the euro area countries, had no impact on investment decisions in the chosen timeframe. This is a slight contradiction of the generally accepted theory that tight monetary policy constrains FAI and correlates negatively with economic growth. The result might be explained by the response of the central banks of the advanced economies to the global financial crisis, which was to lower interest rates and adopt extraordinary expansionary measures in the hope of preventing an economic downturn. The problem may, though, have lain in the relative heterogeneity of the monetary policy strategies adopted by the national central banks. This was especially true of Bulgaria, which introduced a currency board to fight hyperinflation in 1997 and has maintained it ever since. These assumptions appear plausible – especially when it is borne in mind that the ECB's monetary policy (expressed as the cross-term $(EMU \cdot NMP)_{i,(t-1)}$) affected FAI according to expectations. In the first two steps (columns 1 and 2) the variable was insignificant. However, when another cross-term was introduced ($(FIN \cdot NMP)_{i,(t-1)}$, column 3), $(EMU \cdot NMP)_{i,(t-1)}$ became statistically significant with regard to FAI. Membership of the EU was also statistically significant. In this respect the coefficient's sign was in line with the direction of influence of the cross-term $(EMU \cdot NMP)_{i,(t-1)}$. This may imply that external investors perceived the EU as a homogenous business environment, which had been the dominant

viewpoint before the financial crisis hit the EU in 2008–09. There was a misperception that the EU and EMU countries were homogenous in terms of their financial situation, which was caused by interest rate convergence due to nominal compliance with the Maastricht criteria. International businesses and investors thus perceived the EMU and EU as too important and too big to fail. As a consequence, EMU interest rates did not reflect country risk and the price of sovereign default was never included in the interest on sovereign bonds in the euro area (Rossi & Dafflon 2012, p. 113).

Table 1. Results: Estimation Using LSDV

Variable	1	2	3	4
$MARKETCAP_{i,(t-1)}$	−6.02644 (−0.114)	−7.23841 (−0.132)	−1.16206 (−0.217)	−1.9059 (−0.346)
$GROSSPROFIT_{i,(t-1)}$	−0.128152 (−0.925)	−0.153038 (−1.16)	−0.157167 (−1.23)	−0.146833 (−1.15)
$(D/E)_{i,(t-1)}$	−1.01024 (−0.741)	−1.22082 (−0.961)	−1.32496 (−1.10)	−0.767695 (−0.656)
$FIN_{i,(t-1)}$	0.054134** (2.28)	0.050003** (2.36)	0.0476637** (2.32)	0.0537250 ** (2.53)
$GOVDEBT_{i,(t-1)}$	−0.0830794*** (−4.0)	−0.0572665** (−2.75)	−0.0561361** (−2.57)	−0.0460612* (−1.84)
$EUMEM_{i,t}$	−2.11194** (−1.98)	−2.235** (−1.98)	−2.30524** (−1.97)	−2.67038** (−2.36)
$NMP_{i,(t-1)}$	3.56739 (0.811)	10.1762 (1.48)	7.97462 (1.26)	7.91973 (1.31)
$(EMU \cdot NMP)_{i,(t-1)}$	−1.0838 (−0.726)	−1.36405 (−1.04)	−6.07969* (−1.74)	−6.65786 * (−1.74)
$(GOVDEBT \cdot NMP)_{i,(t-1)}$	–	−0.186830** (−2.09)	−0.182502** (−2.20)	−0.177009 ** (−2.03)
$(FIN \cdot NMP)_{i,(t-1)}$	–	–	0.0365400 (0.797)	0.0330526 (0.689)
$BUDGET_{i,(t-1)}$	–	–	–	0.264743 *** (3.10)
Constant	34.5808*** (3.71)	34.7131*** (3.69)	34.9521*** (3.76)	32.5639 *** (3.24)
R^2	0.8747181	0.8717834	0.8817758	0.8862445

Notes: 1. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; 2. I have adopted a fixed effects model; 3. Estimation using a LSDV estimator; 4. Estimation using robust standard errors; 5. T-statistics are in parentheses.

Source: author's own calculations based on data gathered from the sources mentioned in Section 4.

Notwithstanding these explanations, the results did not justify complete acceptance of hypothesis H1.

Government debt $GOVDEBT_{i,(t-1)}$ had a negative impact on FAI, which accords with mainstream empirical findings. Regardless of the specification of equation (5) (columns 1–4), this result was reported throughout the four-step estimation process. The explanations for the negative influence of government debt on investment and, more broadly, on economic activity, rest on the fact that higher government debt increases a country's credit and investment risks. The influence of the second variable describing a country's fiscal position – $BUDGET_{i,(t-1)}$ – was also statistically significant, and its coefficient was in line with expectations. The empirical results corroborated the suppositions formulated in hypotheses H3 and H4. The influence of these two variables on investment and economic growth may, however, be ambiguous. Future research should therefore seek to ascertain whether the debt or deficit was income-producing or income-consuming; only the former contributes to economic growth.

As expected, the monetary policy variable revealed that government debt had a negative impact on FAI. The introduction of the cross-term $(GOVDEBT \cdot NMP)_{i,(t-1)}$ changed the $GOVDEBT_{i,(t-1)}$ coefficient from −0.0830794 to −0.0572665. The cross-term parameter of −0.18683 was greater than the $GOVDEBT_{i,(t-1)}$ variable, which was in line with expectations. This result confirmed hypothesis H3A. The inclusion of a further cross-term, $(FIN \cdot NMP)_{i,(t-1)}$, modified these parameters slightly (column 3) but did not disturb the general proportion. The introduction of the $BUDGET_{i,(t-1)}$ variable had a clear influence on the coefficients of other variables in that the impact of the first cross-term $(GOVDEBT \cdot NMP)_{i,(t-1)}$ grew weaker at −0.177 and the $GOVDEBT_{i,(t-1)}$ coefficient reached −0.04606.

The $FIN_{i,(t-1)}$ ratio was statistically significant at the 5% level throughout the four steps of the estimation, which confirmed hypothesis H2. The results corroborated the growing importance of financial assets and transactions in the non-financial private sector companies. Regardless of the increasing role of short-term investment in the maximisation of shareholder value, it would appear that the (implied) cash flows generated by financial assets held by the non-financial private sector companies contribute to internal sources of FAI funding. This conjecture does not contradict the detrimental effects of financialisation. The model failed to capture the combined impact of monetary policy and financialisation on FAI. The inclusion of the cross-term variable (column 3) saw the $FIN_{i,(t-1)}$ coefficient fall from 0.05 to 0.047 and improved the model by bringing $EUMEM_{i,t}$ to statistical significance.

Hypothesis H2A was, however, rejected. The most probable reasons for the cross-term's failure to capture the balance sheet channel of monetary policy transmission are the heterogeneity of monetary policy in the chosen timeframe, a monetary policy that was only mildly restrictive and thus had no impact on the prices of financial assets and the indirect translation of the specification for the monetary policy variable in the model. The robustness check explores this final issue further.

The overall results of the estimation suggest that debt-to-equity ratio $(D/E)_{i,(t-1)}$ did not have a significant impact on FAI in the chosen timeframe. When combined with weak evidence for the impact of monetary policy and the rejection of hypothesis H1, this implies that monetary policy has a limited impact on FAI.

6. Robustness Check

In this section an extension of the baseline model is estimated to check the robustness of the initial results. The modified version (equation (6) below) uses the three-month interbank offered rate (IBOR 3M) as an alternative measure of monetary policy. Replacing the variable constructed according to equations (1) and (2) with an interest rate may capture the interest rate effects and highlight the balance sheet channel of monetary transmission. Its impact on the government debt variable is unclear. The same four-step estimation procedure using an LSDV estimator is followed:

$$
\begin{aligned}
FAI = {} & MARKETCAP_{i,(t-1)} + GROSSPROFIT_{i,(t-1)} + (D/E)_{i,(t-1)} + FIN_{i,(t-1)} + \\
& + GOVDEBT_{i,(t-1)} + EUMEM_{i,(t-1)} + IBOR\,3M_{i,(t-1)} + EMU_{i,(t-1)} + \\
& + (GOVDEBT \cdot IBOR\,3M)_{i,(t-1)} + (FIN \cdot IBOR\,3M)_{i,(t-1)} + \\
& + BUDGET_{i,(t-1)} + year_i + \varepsilon_{i,t}
\end{aligned}
\tag{6}
$$

$IBOR\,3M_{i,t}$ stands for the interbank offered rate in country i in year t. EURIBOR 3M was used for the euro area and the respective interbank offered rates for the other economies. The remaining notations are the same as in equation (5). The results of the estimation are set out in Table 2 below.

The three-month interbank offered rate ($IBOR\,3M_{i,(t-1)}$), which approximated the expectations of investors and businesses regarding central bank decisions, had no impact on FAI. This meant that hypothesis H1 was rejected in all but the first step of the modelling process (column 1). This

confirmed the result obtained in the initial model, which suggested that monetary policy had no clear impact on FAI in the chosen timeframe.

Table 2. Results: Estimation using LSDV

Variable	1	2	3	4
$MARKETCAP_{i,(t-1)}$	4.47770 (0.655)	2.26405 (0.344)	5.28961 (0.807)	4.53052 (0.715)
$GROSSPROFIT_{i,(t-1)}$	−0.0724033 (−0.514)	−0.0661879 (−0.464)	−0.03352 (−0.235)	−0.0418052 (−0.313)
$(D/E)_{i,(t-1)}$	−1.84816 (−1.54)	−1.95619* (−1.82)	−1.51486 (−1.47)	−0.662125 (−0.706)
$FIN_{i,(t-1)}$	0.0612063** (2.45)	0.0528469** (2.18)	0.0675391*** (2.78)	0.0744125*** (3.06)
$GOVDEBT_{i,(t-1)}$	−0.0280287 (−0.766)	−0.0156185 (−0.391)	−0.0224623 (−0.618)	−0.00200865 (−0.0517)
$EUMEM_{i,(t-1)}$	−1.99744** (−2.17)	−1.77449** (−2.02)	−1.31442* (−1.63)	−1.91448** (−2.21)
$EMU_{i,(t-1)}$	−0.40605 (−0.29)	−0.312219 (−0.22)	−0.840915 (−0.664)	−0.596573 (−0.51)
$IBOR\ 3M_{i,(t-1)}$	−19.2385*** (−7.61)	2.40708 (0.194)	9.42772 (0.666)	12.0389 (1.01)
$(GOVDEBT \cdot IBOR\ 3M)_{i,(t-1)}$	–	−0.961213* (−1.68)	−0.359903 (−0.602)	−0.426987 (−0.866)
$(FIN \cdot IBOR\ 3M)_{i,(t-1)}$	–	–	−1.01460*** (−2.57)	−1.05123*** (−2.9)
$BUDGET_{i,(t-1)}$	–	–	–	0.393964*** (3.43)
Constant	26.1622** (2.49)	27.829*** (2.60)	27.2237*** (2.81)	24.8927*** (2.68)
R^2	0.8745235	0.8781289	0.8848629	0.8945275

Notes: 1. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively; 2. I have adopted a fixed effects model; 3. Estimation using a LSDV estimator; 4. Estimation using robust standard errors; 5. *T*-statistics are in parentheses.

Source: author's own calculations based on data gathered from the sources mentioned in Section 4.

The introduction of the *IBOR 3M*$_{i,(t-1)}$ variable captured the balance sheet effects better than the baseline monetary policy variable. Hypotheses H2 and H2A were both accepted. Though the results did not confirm hypothesis H3, the partial findings (column 2) implied that hypothesis

H3A might be true. The finding that government debt had no statistically significant impact on FAI ran counter to previous results, but was no cause for alarm as it was consistent with mainstream empirical findings. There are two ways in which this might be explained: (1) The difficulty in obtaining conclusive results in this particular area may lie in the heterogeneity of EU economies and fiscal policies. (2) The influence of raised levels of government debt, which often exceeded generally-accepted thresholds, may have eluded the model by being reversed, eliminated or turning non-linear. The results of the estimation confirmed that a country's budgetary position had an influence on FAI.

The impact of the structure of liabilities' on FAI became unclear following the introduction of *IBOR* $3M_{i, (t-1)}$. The partial results (column 2) implied that the D/E ratio had a significant influence on FAI. The negative sign of the coefficient suggested that investment decisions were to some extent influenced by financial constraints, which is consistent with empirical research in this field and with economic logic. Firm-level data is required to determine the exact nature of these constraints. The results in the preceding steps (column 1) and in the following steps (column 3) were promising and relatively close to the 10% significance level, which suggests that the correlation could have been captured had the timeframe been extended. There was a negative correlation between EU membership and FAI, which supported the result obtained previously. Participation in the EMU, on the other hand, proved of little consequence.

7. Conclusion

The research set out in this paper has explored the combined impact of tight monetary policy, government debt, budget deficits, financialisation, and financial leverage on the FAI of non-financial private firms in the EU countries in 1999–2014.

The study has revealed that the impact of the ECB's monetary policy on the investment decisions of non-financial private sector companies remains in question. The influence of monetary policy combined with EU membership suggested the possibility that euro-area policy has come to dominate the EU financial markets. Businesses should therefore now look to the ECB before deciding on FAI. In view especially of the results obtained from the alternative model, hypothesis H1 requires further investigation.

The investigation found that the ratio of financial assets to total assets was positively correlated with the FAI levels of non-financial private firms.

Replacing the initial monetary policy variables with IBOR 3M revealed the possibility that there was an active balance sheet channel in the chosen timeframe and corroborated the supposition that, notwithstanding the detrimental effects of financialisation, the flows generated from the financial assets might serve as an internal source of FAI funding that reacts strongly to the tightening of monetary policy.

There was at least some evidence that government debt hinders FAI. The baseline findings confirmed that raised government debt has a greater impact in periods of tight monetary policy. The suggestion from the robustness check that the correlation may be open to question is supported by mainstream empirical papers, which also imply that the relationship may be unclear. On the other hand, the impact of a budget deficit or surplus correlated positively with FAI regardless of the specification of the monetary policy variable.

The debt-to-equity ratio results obtained from the robustness check suggested that the reason no statistically significant impact was discovered might have lain in the specification of the monetary policy variable. Notwithstanding this specification, neither the market capitalisation or the gross profit share of the non-financial corporations proved significant.

This paper does not cover the period when the ECB introduced its unconventional monetary policy measures. Given the fiscal situation of the EU and the further monetary easing introduced by the ECB in the spring of 2016, further research is required to investigate the channels of monetary transmission and the impact of these decisions on both the public and private sectors of European economies. The growing political uncertainty surrounding the United Kingdom's continued membership of the European Union should also be considered.

Because a macro-level analysis provides only a general overview of the relationships captured and discussed in this paper, the practical use of these results is limited. A more profound exploration of the issues raised in this paper will require a study supported by firm-level data, which would help capture agent-specific characteristics that will explain the relationships observed in more detail.

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Abstract

Oddziaływanie policy mix i finansyzacji na inwestycje przedsiębiorstw w Unii Europejskiej w latach 1999–2014

W artykule zbadano łączne oddziaływanie restrykcyjnej polityki pieniężnej, długu publicznego, deficytu finansów publicznych, finansyzacji i dźwigni finansowej na poziom inwestycji niefinansowych prywatnych przedsiębiorstw w Unii Europejskiej w okresie 1999–2014. Posługując się modelowaniem panelowym z uwzględnieniem efektów stałych, zweryfikowano sześć odpowiednich hipotez. Choć brak jednoznacznych efektów w zakresie łącznego oddziaływania polityki pieniężnej i zadłużenia publicznego, otrzymane wyniki wskazały na to, że oddziaływanie polityki pieniężnej ograniczyło się w wybranym okresie jedynie do strefy euro. Mimo udokumentowanego negatywnego wpływu finansyzacji na gospodarkę rezultaty sugerują, że przepływy pieniężne generowane przez aktywa finansowe utrzymywane przez przedsiębiorstwa mogły służyć jako wewnętrzne źródło finansowania inwestycji, podlegające silnemu wpływowi polityki monetarnej. Analiza wskazała również możliwość wystąpienia kanału bilansowego transmisji polityki pieniężnej. Biorąc pod uwagę zagregowany charakter danych, dalsze badania na poziomie mikro w tym zakresie są potrzebne do zweryfikowania tej hipotezy.

Słowa kluczowe: polityka pieniężna, polityka fiskalna, deficyt, dług publiczny, finansyzacja, inwestycje.

Viktor Shevchuk

THE REAL AND NOMINAL EFFECTS
OF LARGE DEVALUATIONS IN UKRAINE*

Abstract

Using monthly data for the 2000–14 period, this paper discusses the macroeconomic effects of large devaluations in Ukraine. Employing a time-varying parameter framework, the author shows that a nominal devaluation in "normal" times is associated with an increase in exports and a decrease in imports, an acceleration in consumption price inflation, and a contraction in industrial output (since 2014). However, a currency collapse is likely to be inflationary and contractionary in respect of exports, imports, industrial output, and retail trade turnover. The author shows that export dynamics is stimulated by higher world commodity prices and industrial growth abroad. Since the 2008–09 financial crisis, industrial output has become more strongly linked to the performance of the largest foreign trade partners.

1. Introduction

The steep downward realignments of the Ukrainian *hryvna* in November–December 2008 and February–November 2014 were associated with a sharp drop in foreign trade, industrial output, and retail trade, and were followed by a significant increase in consumer prices (Figure 1). A prompt fall in imports, and a slow response from exports to changes in relative prices, are both typical outcomes of large devaluations or currency collapses in low-income and middle-income countries (Alessandria et al. 2013; Burstein et al. 2005). There was a time when unfavourable developments in the

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foreign trade sector were aggravated by a contractionary output effect (Bahmani-Oskooee & Miteza 2006; Bebczuk et al. 2006; Chou & Chao 2001; Hutchison & Noy 2005; Pineres & Cantavella-Jorda 2010). In general, though, industrial economies respond to devaluation shocks by expanding, and developing economies respond to them by contracting (Ahmed et al. 2002). Studies of Central and East European countries have returned mixed findings in this respect, which have included detecting a contractionary effect (Miteza 2006) and returning results that allow no clear, country--specific conclusions to be drawn (Bahmani-Oskooee & Kutan 2008). The various exchange rate effects can be explained by heterogeneous factors, such as the business cycle, capital inflows, the dollarisation of domestic and external liabilities, export growth, openness to trade, overvaluation of the real exchange rate, and slow growth abroad (Bebczuk et al. 2006; Bussière et al. 2012).

a) Nominal exchange rate

b) Industrial output and retail trade turnover

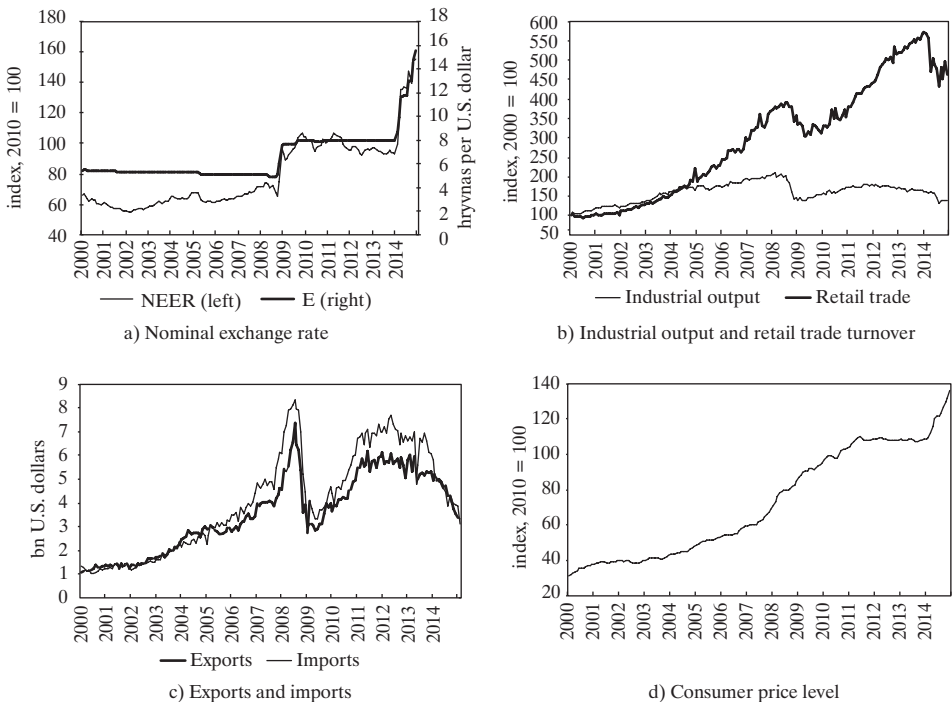c) Exports and imports

d) Consumer price level

Fig. 1. Ukraine: Selected Macroeconomic Indicators, 2000–14

Source: IMF International Financial Statistics.

Although the unfavourable effects of large devaluations are well--documented, the possibility that output losses are materialised before the currency falls, so that the costs of a currency crash stem largely from the factors leading up to it, cannot be ruled out (Bussière et al. 2012). Ukraine's industrial output had, for example, been in gradual decline from the middle of 2011, almost two-and-a-half years before the currency collapse of 2014. The country's exports, meanwhile, recovered quite quickly from the middle of 2009, before stagnating in 2011–12 and going into decline from 2013. In a pattern similar to that of 2009, the large and fairly stable trade deficit of 2011–13 was ended by the large devaluation of 2014. The retail trade turnover, as a proxy for the measure of aggregate demand, rose very sharply in 2005–08 before declining in the wake of the 2008–09 financial crash. This was followed by a strong recovery. Unlike industrial output, retail trade turnover increased and showed no signs of slowing down until the very end of 2013.

The aim of this paper is to estimate the macroeconomic effects of a large devaluation and to separate the "pure" impact of exchange rate realignments from other potential effects of a currency crash, which may reflect pre-crisis developments unconnected with changes in the exchange rate. It is assumed for the purposes of this study that large currency devaluations occur where the change in the monthly exchange rate exceeds 10% against a backdrop of relative exchange rate stability over preceding periods[1]. Having introduced the question, the paper now proceeds to a survey of the analytical issues in Section 2 before describing the data and statistical methodology in Section 3. The results of the estimation are discussed in Section 4, while Section 5 draws the disparate strands together in a number of concluding statements.

2. The Analytical Framework

Several mechanisms whose pronounced contractionary effects on foreign trade are well in excess of those implied by the change in relative prices are set in motion following large devaluations. G. Alessandria, J. Kaboski, and V. Midrigan (2010) attribute sharp drops in imports to delivery lags and economies of scale in the transaction technology. Importers respond to

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[1] This assumption is in accordance with popular definitions of currency collapses. Bussière, Saxena, and Tovar (2012), for example, define a currency collapse as a case in which the change in the annual nominal exchange rate in any month during a given calendar year exceeds 15% and is at least 10% above that of the previous year. Finally, the annual change in the nominal exchange rate for the previous year must not exceed 10%.

unanticipated devaluations by reducing inventories, suspending imports and cutting mark-ups to speed up the sale of existing inventory. G. Alessandria, S. Pratap, and V. Yue (2013) argue that the costs of the entry decisions of non-exporters, and of the exit decisions of exporters, might explain why export recoveries are sluggish. It has been demonstrated that substantial export costs lead to a deeper initial contraction and a stronger future recovery in output, with the interest rate as the instrument influencing the future benefits of exporting. Where investment costs are high and consumers patient, which affects the speed of export expansion through the consumption-smoothing mechanism, the incentives to invest in exports are weaker.

Kristin Forbes' open economy model (2002) describes the effect devaluations have on capital to labour ratios and changes in the cost of capital. It is expected that the real sector will contract in economies that experience substantial interest-rate increases and have high capital to labour ratios. The potential for contractionary effects is also included in one variant of the Open Economy Financial Accelerator model (Delli Gatti et al. 2007), which offers the example of a decline in the net worth of domestic firms that leads to an increase in the domestic interest rate following devaluation. Contractionary effects can also be aggravated where interest rates are further increased in an effort to stabilise the exchange rate.

Besides the costs of structural adjustment and unfavourable interest rate developments, a simultaneous devaluation-driven decline in exports and output can also be explained by factors such as the negative wealth effect (a fall in the real value of money and in financial and other assets), the balance-sheet effect (an inverse relationship between the foreign currency debt and demand in the private and public sectors), capital outflows or strong inflationary pass-throughs (Blanchard et al. 2010; Kamin & Rogers 2000; Lizondo & Montiel 1988). The AD-AS model makes it possible to visualise these common devaluation-related issues. Despite its numerous shortcomings, such as an alleged lack of microeconomic foundations, inconsistent treatment of aggregate supply, uneven treatment of the counter-cyclical movement of the real wage and unsatisfactory treatment of dynamics, the AD-AS framework is both inherently consistent and well suited to incorporating important insights from behavioural economics and from the Keynesian and structuralist traditions (Dutt & Skott 2005)[2].

[2] The AD-AS framework explains the interaction between the "demand side" and the "supply side" of the economy using accounting identities, equilibrium conditions and behavioural and institutional equations (Dutt & Skott 2005). The "demand side" incorporates factors relating to the

This is illustrated by the following simplified static version of the AD-AS model (apart from the interest rate, all variables are expressed in logarithms)[3]:

$$y_t^S = s_0 + s_1 (m_t - p_t) - s_2 (e_t + p_t^* - p_t) + u_t, \qquad (1)$$

$$y_t^D = a_0 + a_1 (m_t - p_t) - a_2 (debt_t + e_t) - a_3 (r_t + \Delta) + a_4 (e_t + p_t^* - p_t) + \varepsilon_t, \qquad (2)$$

where y_t^S and y_t^D are aggregate supply and aggregate demand; m_t is the aggregate money supply; p_t and p_t^* are domestic and foreign price levels; e_t is the nominal exchange rate; $debt_t$ is the foreign debt; r_t is the real interest rate; Δ is the risk premium required by domestic lenders and u_t and ε_t are stochastic factors.

In equation (1), the aggregate supply (*AS*) is increased by the real money supply, $m_t - p_t$, and appreciation of the real exchange rate, $e_t + p_t^* - p_t$. Assuming a strong inflationary pass-through, the direct contractionary effect of devaluation (s_2) is likely to be strengthened by a negative financial effect (s_1), as an increase in the price level produces a decrease in the real money supply.

Equation (2) describes aggregate demand as a positive function of the wealth effect, $m_t - p_t$. Depreciation of the real exchange rate, the balance--sheet effect, $debt_t + e_t$, and a rise in the real interest all have a contractionary effect. Because it depends on the comparative strength of relative price and balance-sheet effects, the net effect of the exchange rate on demand becomes ambiguous. If the Marshall-Lerner condition holds and the balance-sheet effect is weak[4] devaluation is expansionary in respect of aggregate demand. Otherwise the net effect of devaluation is to decrease demand.

Figure 2 presents an interpretation of devaluation effects. There is a downward sloping aggregate demand curve (*AD*) and an upward sloping aggregate supply curve (*AS*) in the price-output space. Initially, output is determined at Y_0 and price at P_0 (point *A*). Following an improvement in

demand for goods and assets, while the "supply side" is typically related to the output and pricing decisions of producers and factor markets. Though many of the criticisms made of the AD-AS model are valid, it remains a useful device for price-output determination (Docherty & Tse 2009).

[3] As Blanchard, Faruqee, and Das (2010) state, the lack of dynamics can be justified on the grounds of focusing on the effects of the shocks immediately upon impact, with the direct effect of trade and capital flows dominating expectational effects.

[4] The Marshall-Lerner condition states that there is an improvement in the trade balance if – given domestic and foreign output – the sum of export and import exchange rate elasticities is above unity. For the medium term at least, this is usually the case. To give an example, the Marshall--Lerner condition holds – mainly due to the high relative price elasticities of imports – in a study of 46 middle-income and emerging economies conducted in 1980–2005 (IMF 2006).

relative prices, which is the dominant devaluation-driven mechanism, there is a rightward shift in the aggregate demand from AD_0 to AD_1 – mainly through an increase in demand for exports combined with a decrease in imports. The traditional expansionary competitiveness effect leads to greater demand for tradeable goods and increased investment by the firms that have to meet this demand. The effect depends on how open the economy is and on the capital intensity of the output (Carranza et al. 2009). Consequently, the output increases to Y_1 (point B), though at the cost of a moderate increase in the price level to P_1. The extent of the price increase depends on the price elasticity of aggregate supply.
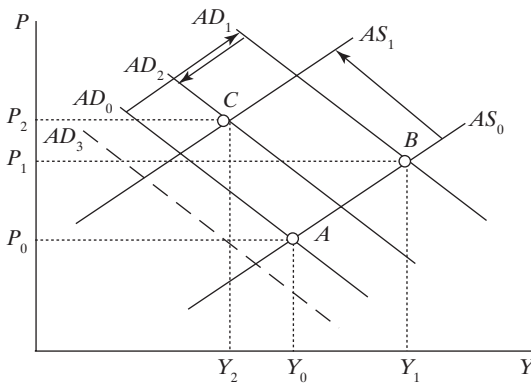

Fig. 2. Macroeconomic Effects of Devaluation

Source: author's own elaboration.

A contraction in the aggregate supply from AS_0 to AS_1 is, however, likely to reduce the expansionary effect. Even when devaluations are prompted solely by external shocks, there are several contractionary supply-side effects, including a reduction in real wages, erosion of the real money supply (in financially-constrained economies) and a higher financial cost of imported inputs and working capital (Kamin & Rogers 2000; Lizondo & Montiel 2003). Although imported capital goods become relatively more expensive, this should not offset the competitiveness effect as the firms in the tradeable goods sector increase investment to meet the greater demand for their output, which is precisely what generates the higher financial costs (Carranza et al. 2009). If there are strong contractionary mechanisms in aggregate demand, such as the balance-sheet effect, the redistribution of savings in favour of wealthier households or an increase in the interest rate, it is likely

that the leftward shift in the AD schedule will trigger a clear contractionary effect in the real sector. The new equilibrium will then be at lower output Y_2 and higher price level P_2 (point *C*). Following devaluation, the wealth effect implies a direct relationship between the real value of assets and private consumption. This is contractionary because higher inflation erodes the value of assets denominated in local currency. The outcome is ambiguous, though, if private holdings include assets denominated in foreign currencies. The net effect depends on whether any increase in the value of these assets is strong enough to outweigh the impact of higher prices.

Large devaluations may have an additional negative impact that extends beyond the "traditional" balance-sheet effect, which involves a situation in which the net worth of firms holding debt denominated in a foreign currency, but assets or income flows denominated in the domestic currency, instantly deteriorates (Carranza et al. 2009). Where small devaluations are concerned there is only a slight rise in the risk to the indebted firm. Meanwhile, the balance-sheet effect at debt-ridden and financially vulnerable firms will be highly intense when there is a large devaluation. The firms then have to liquidate their capital or go bankrupt because they have no access to credit, which leads to a "discrete" decrease in investments. Destabilisation due to currency mismatches between assets and liabilities is likely to be much more serious for firms in the non-tradeable sector that do not directly gain from the relative price (competitiveness) effect. Financial difficulties in Ukraine's economy in the wake of the 2008–09 and 2014 currency crises were further aggravated by a severe deterioration in the net worth of local banks, which affected firms in both the tradeable and non-tradeable sectors. Assuming there are balance-sheet effects at firms and banks, the extent of the output slump is comparatively easy to explain. It should be borne in mind that increases in the value of foreign currency assets held by households can moderate falls in aggregate demand.

As Figure 2 makes clear, a fall in demand from AD_1 to AD_2, which could be associated with the balance-sheet effect, is responsible for a lower inflation pass-through in the case of large devaluations. Referring to a panel of more than 100 countries with differing degrees of dollarisation, a team of researchers found that those with higher dollarisation experienced higher inflation pass-through, but that large depreciations tended to have a negative impact on the pass-through coefficient that was more intense when the economy's dollarisation level was higher (Carranza et al. 2009).

Theoretical and empirical arguments are advanced in a further paper to argue that the contractionary effects of currency devaluation in the wake

of the 2009 world financial crisis can be explained by the balance-sheet effect. In this way, the higher the foreign debt, the larger is the increase in the real value of debt from a depreciation and the stronger is the adverse effect on output (Blanchard et al. 2010). If the Marshall-Lerner condition does not hold and the balance-sheet effect is strong, devaluation brings about a decrease in aggregate demand. This means that the schedule of aggregate demand can shift leftwards to AD_3 below the initial curve AD_0. The contractionary effect is then attained even without any unfavourable supply-side developments. A fall in the price level is to be expected in the event of unfavourable supply-side developments.

These arguments are consistent with the empirical finding that where exports do not respond strongly to relative prices there will be a fall in output that can last as long as one-and-a-half years (Frankel 2005). The inverse relationship between devaluation and exports in Latin American countries is due to a combination of the balance-sheet effect, capital outflow and a decline in investments (Pineres & Cantavella-Jorda 2010). The dominant factor influencing lower demand for imports is output contraction. While downward realignments in exchange rates also exert an influence here, it is of much less importance (Calvo & Reinhart 2002).

Turning to a wider context, an increase in inflation can be harmful for both aggregate demand and aggregate supply. Krugman and Taylor (1978) were among the first to explain the importance of the inflation mechanism in a devaluation-driven decline in output. The redistribution of purchasing power in favour of wealthier households with a higher propensity to save leads to a simultaneous decrease in aggregate demand, output and imports. If there are *ad valorem* taxes on exports, or exporters dominate among taxpayers, as is the case in Ukraine, demand is further reduced by the budget surplus, as the government has a short-run saving propensity of unity. The higher the trade balance deficit at the moment of devaluation, the stronger the expected decline in output. As neither imports nor exports are very sensitive to relative price changes in the short-run, the primary favourable effects of devaluation on the trade balance, if any, come primarily through economic contraction rather than substitution effects related to aggregate demand. To prevent a sharp decline in output, it is suggested that devaluations should be accompanied by policies designed to encourage private investment, stimulate export or substitute for imports (subsidies, tariffs, preferential credit).

3. Data and Statistical Methodology

As all of the downward realignments in its currency have been sharp rather than persistent, it is easy to identify the large devaluation episodes Ukraine has experienced (Figure 1a). The falls in the *hryvna* exchange rate of 19% and 27.7% in November–December 2008 was preceded by a long period of exchange rate stability that began in 2000. The second devaluation episode began in February–March 2014, when the *hryvna* depreciated by 24.9% and 9.7%, respectively. The currency then proceeded to lose a further 12.5% of its value in August 2014 and an additional 15.6% in October 2014.

After Bussière, Saxena, and Tovar (2012), the dynamics of Ukraine's industrial output, ind_t (index, 2000=100); exports and imports, $exports_t$ and $imports_t$ (in millions of 2000 USD); retail trade turnover (in millions of 1996 *hryvnas*); and consumer prices (index, 2010=100) were linked to the nominal effective exchange rate, $neer_t$ (index, 2010=100), and to a set of exchange rate dummies which control for the timing of a large devaluation.

The following two equations give us our TVP (time-varying parameters) model:

$$x_t = \sum_{i=-m}^{m} \alpha_i D_{t-1} + \beta_{1,i} x_{t-1} + \beta_{2,t} neer_t + \beta_{3,t-1} neer_{t-1} + \beta_{4,t} \mathbf{K}_t + \varepsilon_t, \tag{3}$$

$$\beta_{j,t} = \beta_{j,t-1} + \xi_{j,t}, \qquad j = 1, 2, 3, 4, \tag{4}$$

where x_t is the dependent variable, i.e. ind_t, $retail_t$, cpi_t, $exports_t$ or $imports_t$; $neer_t$ is the exchange rate; $\mathbf{K}_t$ is the vector of exogenous variables; ε_t is the stochastic factor; and D_t is the dummy for large devaluations. Specifically, D_t is equal to one if there is a large devaluation in period t, which is measured by a number of six-month intervals: up to 6 months ($T \pm 6$); from 7 to 12 months ($T \pm 12$); from 13 to 18 months ($T \pm 18$). Except D_t, all of the variables are used in the form of the first differences of logarithms, i.e. $y_t = \log Y_t - \log Y_{t-1}$, where Y_t is the level of a variable.

Equations (3) and (4) are respectively the measurement equation and transition equation. The disturbance terms, ε_t and $\xi_{j,t}$, are mutually uncorrelated and independently normally distributed. The majority of the time-varying parameters are recursively modelled ($\xi_{j,t} = 0$), but those modelled on lagged exports and consumer price inflation follow a random walk without drift.

The fixed coefficients α_i measure the effects of large devaluations as sharp realignments of a nominal exchange rate. In this context, the parameters $\beta_{2,i}$

measure a "pure" time-varying response to the nominal effective exchange rate devaluation on impact. Of the other components, parameters $\beta_{1,i}$ and $\beta_{3,i}$ measure the time-varying response to the lagged value of endogenous and exogenous variables respectively. The vector of exogenous variables includes the wholesale price level (index, 2010 = 100), wpi_t; the lending rate, rl_t (in %); world prices for food, metal and industrial inputs, $food_t$, $metal_t$ and $pind_t$ (index, 2010 = 100); and the industrial output of the euro area and Russia, which are Ukraine's two largest trading partners, $indeuro_t$ and $indrus_t$ (index, 2010 = 100). Most of the monthly series were obtained from the IMF's International Financial Statistics database. The world price indexes were also taken from the IMF dataset.

The export and import series were expressed in terms of constant 2000 USD and deflated by the United States Consumer Price Index. The use of the data sample for the 2000:M1–2014:M12 period minimised the influence of the initial conditions used to begin estimating the TVP model. It is worth noting that the Ukrainian *hryvna* passed through a period of serious instability in 1998–99, which was only two years after its introduction in September 1996.

4. Estimation Results

The fixed coefficient estimates of the devaluation dummies are reported in Table 1. As given by the coefficient of the dummy variable with subscripts $T + 6$, $T + 12$ and $T + 18$, no large devaluation was preceded by significant changes in either foreign trade or industrial output. The finding of Bussière, Saxena, and Tovar (2012) that countries experiencing a currency collapse experience output rates of growth below the equilibrium level was thus not confirmed. It was confirmed, however, that large devaluations reduce growth rates during the devaluation event (the coefficient on D_T was statistically significant at the 1% level), which is accompanied by a fall in both exports and imports. Statistically significant post-devaluation effects were identified for the dynamics of retail trade, for the first six months following devaluation, for exports and more than six months after the devaluation event. Consumer price inflation, which was still having a quite sustained impact up to one- -and-a-half years after a large devaluation, was also among the statistically significant post-devaluation effects.

The filtered estimates for the time-varying parameters based on the information available up to time t are presented in Figures 3–7, along with their two standard-error bands. Exchange rate depreciation contributed to

an increase in exports on impact from 2005 (Figure 3), which suggested that the competitiveness effect of a weaker currency, the *hryvna*, was strong enough for "normal" times. It is worth noting that the statistical significance of the coefficients on $neer_t$ was much higher for the 2009–14 period. The same positive exchange rate effect with a lag of six months had been present until the beginning of 2009. However, given the coefficient on $neer_{t-6}$ was on a downward trend it gradually weakened, and has completely disappeared since.

Table 1. Direct Effects of Large Devaluations

Dummy variables	Dependent variables				
	Exports	Imports	Industrial Output	Retail trade	Consumer prices
D_{T+18}	−0.013 [0.015]	−0.002 [0.099]	−0.003 [0.006]	0.012 [0.010]	−0.001 [0.002]
D_{T+12}	0.003 [0.014]	0.012 [0.658]	0.003 [0.366]	−0.007 [0.013]	0.001 [0.003]
D_{T+6}	0.020 [0.006]	0.023 [0.020]	−0.007 [0.006]	−0.010 [0.015]	0.001 [0.002]
D_T	−0.091** [0.042]	−0.059** [0.028]	−0.035*** [0.008]	−0.006 [0.014]	0.001 [0.007]
D_{T-6}	−0.038 [0.025]	0.008 [0.023]	−0.002 [0.008]	−0.033** [0.014]	0.008** [0.003]
D_{T-12}	0.031* [0.018]	−0.008 [0.017]	0.001 [0.008]	0.001 [0.013]	0.002 [0.002]
D_{T-18}	−0.015 [0.017]	0.005 [0.015]	0.006 [0.006]	0.017 [0.012]	0.006* [0.002]

Notes: 1) Standard errors are in square brackets; 2) ***, **, and * denote 1%, 5%, and 10% statistical significance levels, respectively.

Source: author's own calculations.

There was a strong relationship between Ukraine's exports and world metal prices from 2003 and between Ukraine's exports and food prices from 2006 with a spike at the end of 2008. The positive effects of industrial output in the euro area and Russia from 2009 tended to grow over time. The coefficients on $indeuro_{t-1}$ were thus in excess of those on $indrus_t$ from the beginning of 2011. There was some evidence of an inverse relationship between exports and the interest rate, which was consistent with the findings of Alessandria, Pratap, and Yue (2013).
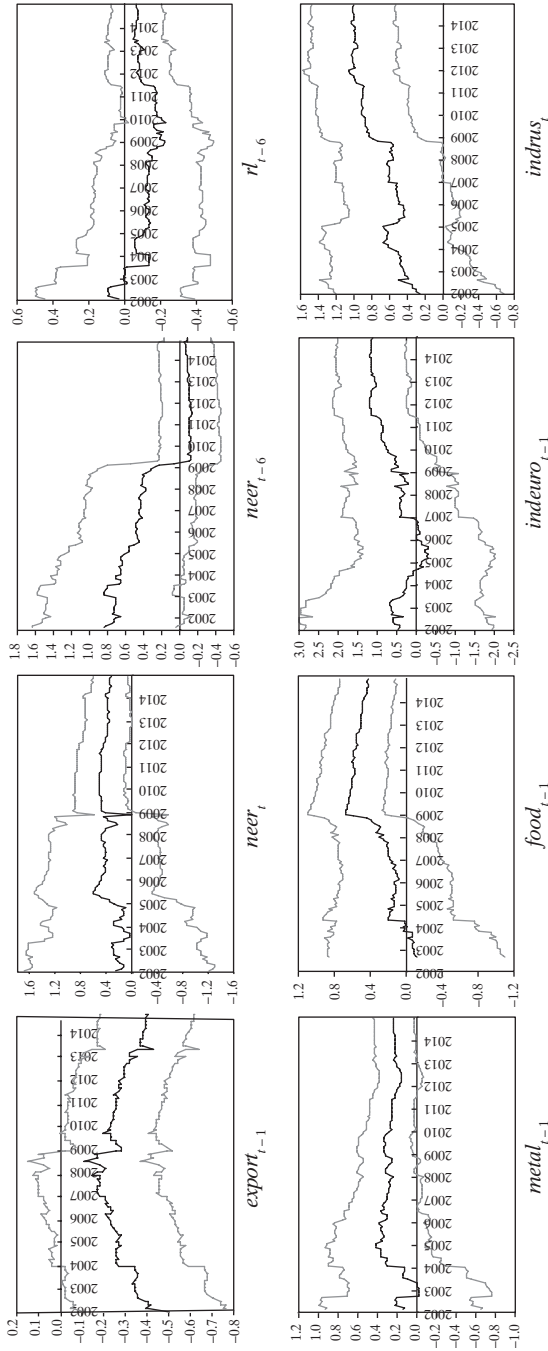
Fig. 3. Determinants of Exports

Note: The black line is the point estimate, while the grey lines represent a two-standard error confidence band around this point estimate; the estimated components begin in 2002:M1 because a two-year training sample is used to start up the Kalman filter.

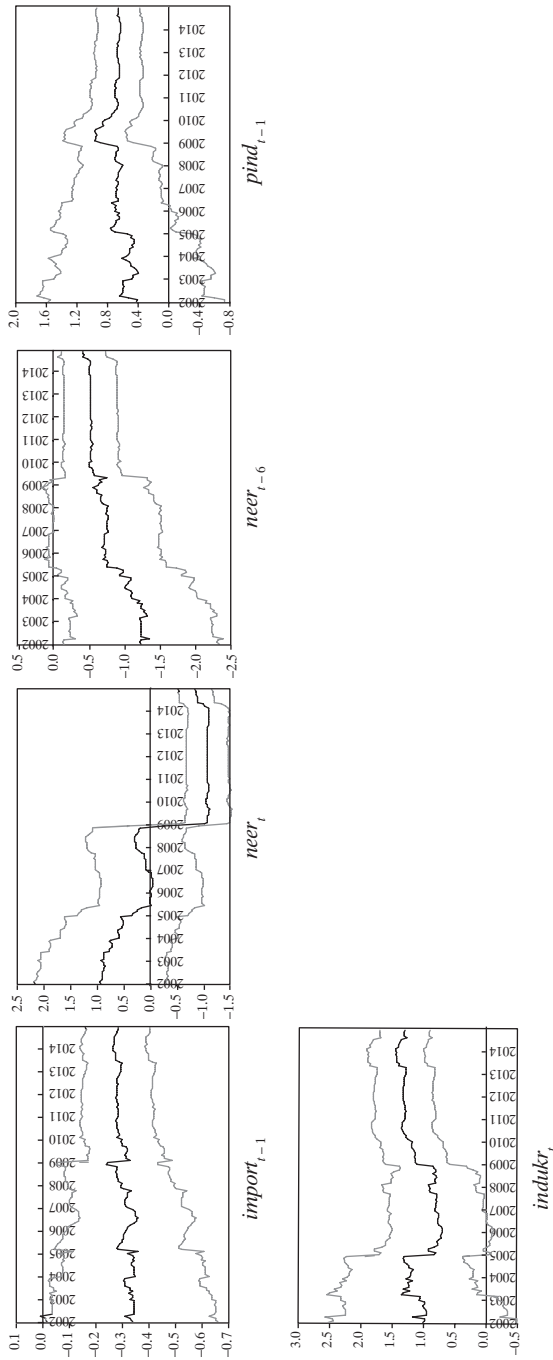Source: author's own calculations.

Fig. 4. Determinants of Imports

Note: The black line is the point estimate, while the grey lines represent a two-standard error confidence band around this point estimate.
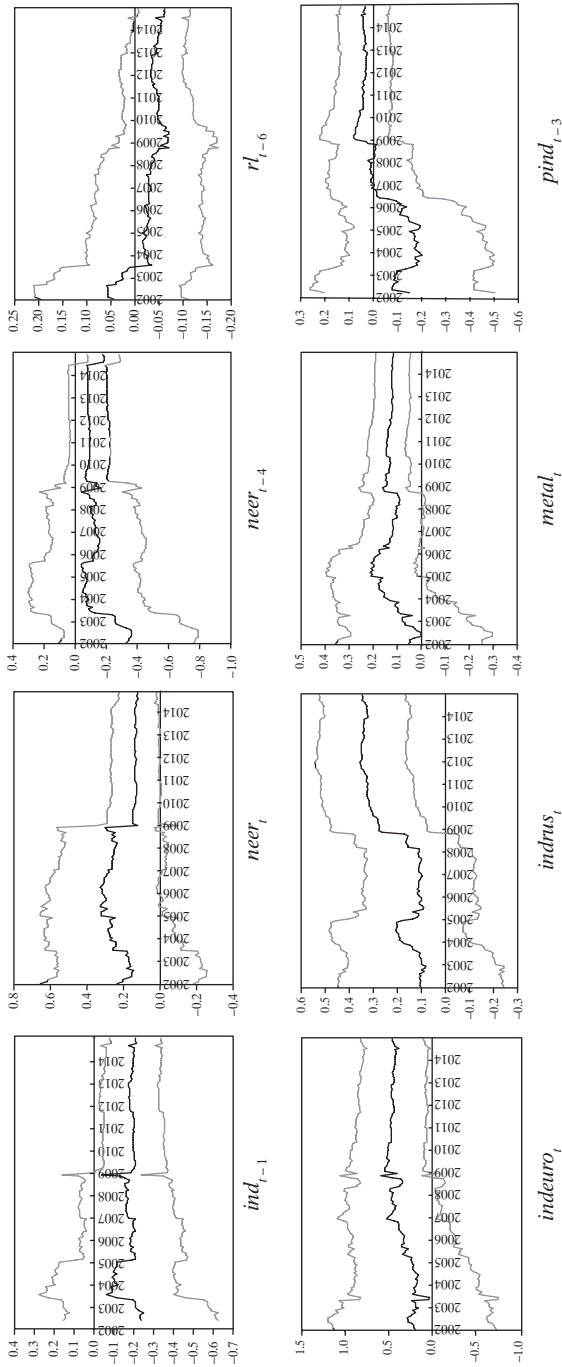
Source: author's own calculations.

Fig. 5. Determinants of Industrial Output

Note: The black line is the point estimate, while the grey lines represent a two-standard error confidence band around this point estimate.

Source: author's own calculations.

Our results suggested that Ukraine's imports fell in the wake of exchange rate depreciation (Figure 4). The coefficient on $neer_t$ was in decline from the 0.9 level until around 2006 when it increased slightly to 0.3. It then dropped sharply to –1 in 2009 before remaining stable until the end of 2013. There was then a moderate increase at the end of the sample period. The lagged coefficient on $neer_{t-6}$ was on an upward trend in 2002–08 and remained relatively stable for a few years afterwards. Given that the coefficient on $indukr_t$ fluctuated between 1.51 and 0.85 over the sample period, there was a strong link between imports and industrial output. When higher prices are being paid for industrial inputs an increase in imports is expected (the coefficients on $pind_{t-1}$ became statistically significant around 2008). Import exposure to world crude oil prices displayed a steady tendency to grow from 2006, but the coefficients on $brent_{t-1}$ were much smaller when compared with those on $pind_{t-1}$.

There was a clear structural shift at the beginning of 2009 with regard to the exchange rate effects on industrial output with two lags (Figure 5). The coefficient on $neer_{t-2}$ fluctuated between 0.24 and 0.38 during 2002–08, which suggested a substantial expansionary effect. The response of industrial output to $neer_{t-2}$ became insignificant in 2009–14. Given the size of the confidence interval, the response to exchange rate depreciation with four lags appeared fairly neutral until the middle of 2009. Summing up the value of the coefficients on $neer_{t-2}$ and $neer_{t-4}$, the exchange rate effects were expansionary until 2008 but turned slightly contractionary for the rest of the sample period. The exchange rate effects had a stronger negative impact in the wake of the 2014 devaluation. Accounting for the exchange rate dummies tended to strengthen the dynamic response of industrial output to exchange-rate shocks.

There was a positive correlation from 2004 between Ukraine's industrial output and world metal prices and between Ukraine's industrial output and world industrial input prices from 2009, which hinted at links between demand and supply and exports and imports respectively. The positive effects of industrial growth were felt by both of Ukraine's biggest trading partners, that is, the euro area countries and Russia. A closer examination of the coefficients on $indeuro_t$ and $indrus_t$ revealed that the stimulus provided by euro area growth was stronger and remained stable over the final few years of the study period. The link between industrial output in Ukraine and Russia grew substantially weaker in 2005, but this situation had been reversed by 2009. The coefficient on $indrus_t$ gradually increased to an average of 0.34 in 2012–14 and stood at approximately 0.1 in 2005–07.

It is interesting to note that there was a local increase to 0.2 in the value of the coefficient on $indrus_t$ in 2004, when there was a distinct reorientation of government policy towards Russia as Ukraine's main "strategic" partner. There was, however, no evidence that the annexation of Crimea and the military conflict in Donbas had any impact on the link between industrial output in Russia and Ukraine. With regard to the link between the two countries' industrial output, this had echoes of the results for 2005. The growing importance of euro area spillovers was illustrated by the upward trend of the coefficient on $indeuro_t$, which began in the middle of the last decade. The value of the coefficient on $indeuro_t$ oscillated within the narrow band of 0.38–0.50 from the post-crisis period onwards.

Retail trade turnover as a measure of domestic demand remained largely unaffected by exchange rate developments before the beginning of 2009. From that time, however, there was weak evidence of a positive relationship between devaluation and retail trade turnover with a three month lag (Figure 6). It was likely that this effect would strengthen in 2014. An important and positive wealth effect generated by large holdings of assets denominated in foreign currencies was identified[5].

That retail trade turnover was closely correlated with the lagged money supply is unsurprising as it was a very strong and stable relationship over time. An increase in the money supply of 1% each month resulted in growth of 0.6% in retail trade turnover. The inverse relationship between the interest rate and retail trade we thought we might detect did not appear until relatively recently; the time-varying coefficients on rl_{t-4} did not reveal any shocks in 2014. Ukraine's retail trade was stimulated by higher world food prices, which reflected the important role of agricultural production in both exports and household income.

Our estimates of consumer price inflation suggested a moderate exchange rate pass-through (Figure 7). The exchange rate pass-through was relatively stable both on impact and with one and five month lags in 2009–13. Pass-through on impact strengthened in 2002–08, but then fell from the end of 2008. The exchange rate pass-through with a one-month lag, which picked up further strength from the beginning of 2014, was a relatively new post-crisis phenomenon. Though it had ceased to exist by autumn 2008, the exchange rate pass-through with a five month lag recovered to some extent after that time. Due to low inflation and expectations of exchange

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[5] With regard to the international investment position of Ukraine, the value of foreign exchange assets owned by its residents increased from USD 19 billion in 2005 to USD 92 billion in 2014.
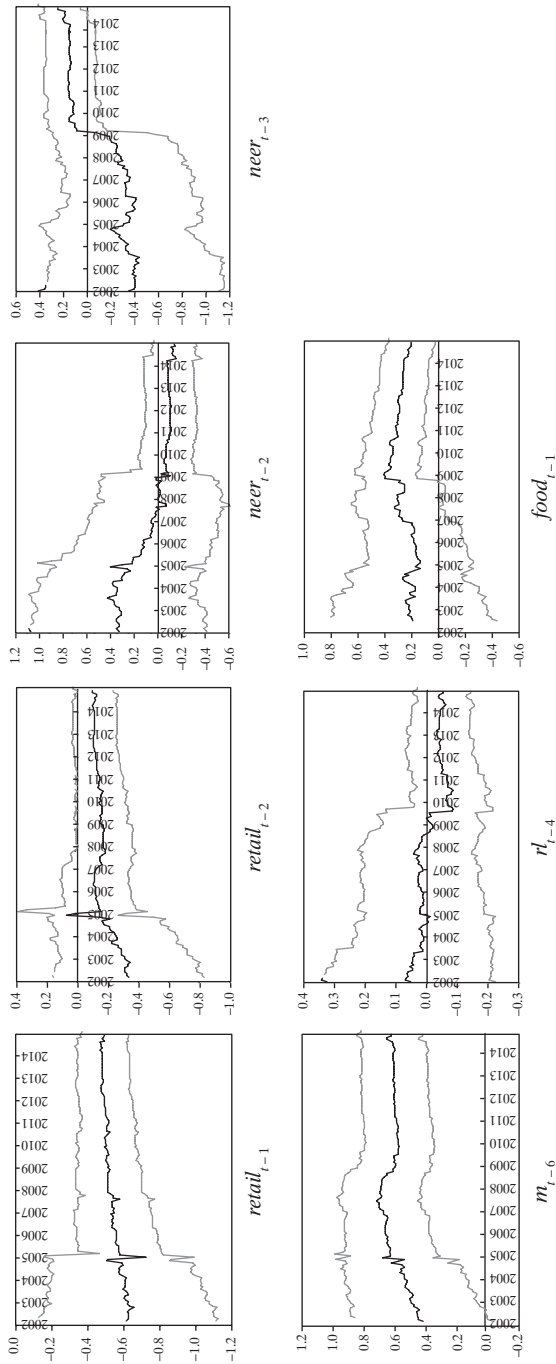
Fig. 6. Determinants of Retail Trade Turnover

Note: The black line is the point estimate, while the grey lines represent a two-standard error confidence band around this point estimate.

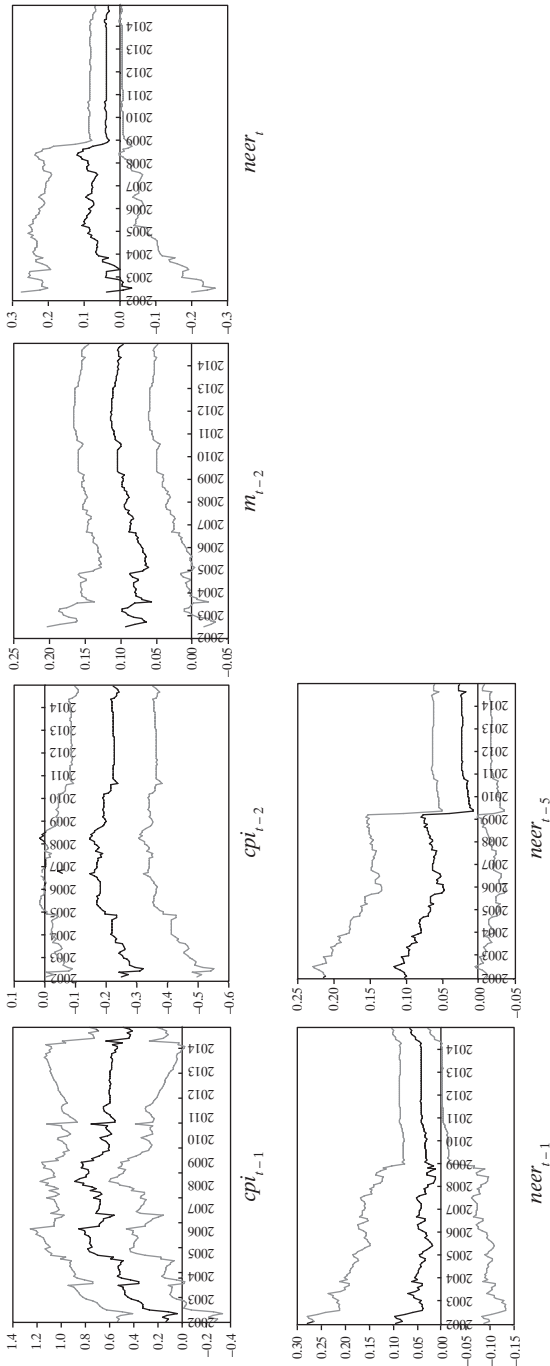Source: author's own calculations.

Fig. 7. Determinants of Consumer Prices

Note: The black line is the point estimate, while the grey lines represent a two-standard error confidence band around this point estimate.

Source: author's own calculations.

rate stability, the pass-through was generally relatively stable during the post-crisis period.

Consumer price inflation was closely correlated with the money supply measured by the money aggregate M2. The coefficient on m_{t-2} nearly doubled in 2005–12. There was no sign of the structural shift around 2008 that was obtained for the coefficients on exchange rate pass-through. The inflationary effect of the lagged money supply weakened somewhat from the beginning of 2012.

As suggested by the estimates for the autoregressive time-varying coefficients, which were modelled as a random walk with a one-month lag and as a recursive process with a two-month lag respectively, consumer price inflation in Ukraine was highly inertial. Regarding the post-crisis developments, the coefficient on cpi_{t-1} ranged between a value as high as 0.8 at the end of 2008 and as low as 0.40 in 2014. There was a downward correction of inflation with a two-month lag. The value of the coefficient on cpi_{t-2} oscillated around –0.22 throughout 2011–14 period, which represented a drop from its local peak of –0.14 in 2008.

5. Conclusion

Controlling for the timing of large downward exchange rate realignment, our results suggest that a nominal devaluation of the *hryvna* would improve the trade balance mainly through a fall in imports. The expansionary effect on industrial output fell away from the beginning of 2009, and there was weak evidence of a lagged contractionary effect in the wake of the severe devaluation of 2014. There was also faint evidence of a positive relationship between devaluation and retail trade turnover from 2008, which might argue for a positive wealth effect generated by domestic holdings of assets denominated in foreign currencies. Our estimates of consumer price inflation pointed to a moderate exchange rate pass-through, which was indeed detected and was relatively stable from 2009. The large devaluation itself, however, which was measured by the appropriate dummy, was likely to be contractionary in respect to exports, imports, and industrial output. A fall in retail trade turnover and accelerated consumer price inflation were likely outcomes.

It was found that world commodity prices and the industrial output of Ukraine's major trading partners supported the country's export dynamics. Imports were correlated strongly with domestic industrial output, which is a fairly standard macroeconomic relationship. Drawing impetus from the growth of its largest foreign trade partners, Ukraine's industrial output

became stronger after the 2008–09 financial crisis. Though retail trade turnover was stimulated by the money supply, expansionary monetary policy had serious inflationary consequences.

The policy implications of our study are clear. While a moderate depreciation of the *hryvna* could assist in improving the trade balance while avoiding significant losses in output, we would recommend avoiding large downward exchange-rate realignments as this tends to restrict either exports or industrial output. Once a large devaluation has become a matter of fact, however, it would be productive to reverse the downward trend with a local exchange rate appreciation as soon as possible.

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Abstract

Realne i nominalne efekty dużych dewaluacji kursu walutowego na Ukrainie

Wykorzystując dane miesięczne z okresu 2000–2014, oszacowano efekty makroekonomiczne dużych dewaluacji waluty ukraińskiej. Stosując podejście ze zmiennymi współczynnikami, zademonstrowano, że nominalna dewaluacja kursu walutowego powoduje standardowy wzrost wartości eksportu oraz zmniejszenie wartości importu, przyspieszenie inflacji oraz zmniejszenie wartości produkcji przemysłowej (od 2014 r.). Gwałtowne załamanie kursu walutowego jest jednak inflacyjne i powoduje zmniejsze-

nie wartości eksportu, importu, produkcji przemysłowej i handlu detalicznego. Eksport zwiększa się w przypadku wyższych światowych cen surowców, a także produkcji przemysłowej za granicą. Od czasu światowego kryzysu finansowego z lat 2008–2009 produkcja przemysłowa jest mocniej uzależniona od sektora przemysłowego największych krajów będących partnerami handlowymi.

Słowa kluczowe: kurs walutowy, produkcja przemysłowa, handel zagraniczny, inflacja, filtracja Kalmana.

Kinga Bauer

THE UNDERSTANDABILITY OF FINANCIAL STATEMENTS IN THE DECISION-MAKING PROCESSES OF INSOLVENCY PROCEEDINGS

Abstract

A financial statement is the only source of information about the financial condition of an entity. Its wide use in bankruptcy prediction proves its informational value. In many countries, the financial statement or elements of it constitute a database of information on the bankruptcy process. The purpose of this paper is to analyse the theoretical and practical aspects of using financial statements as a source of information in the bankruptcy process when decisions are made about the future of the debtor company. Empirical research was carried out in four of 46 district courts conducting insolvency proceedings in Poland. The research showed that, at this stage, neither regulations nor court practice guarantee that the content of the financial statements used in bankruptcy proceedings is intelligible.

Keywords: bankruptcy, insolvency, understandability of financial statements, quality of financial statements.
JEL Classification: M41.

1. Introduction

The regulations of national bankruptcy laws affect the course and efficiency of proceedings and thus are designed to improve the functioning of the national economies of individual countries (Wessels et al. 2009, p. 1). Given that effective implementation of bankruptcy proceedings requires credible and reliable information, national insolvency laws are required to make provision for their documentation. We can conclude from a study conducted by Smith and Strömberg (Smith & Strömberg 2004) that in

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most of the countries investigated the laws mainly oblige debtors to submit information on the value of assets, such as lists of estate assets and claims or a preliminary valuation of assets, when initiating bankruptcy proceedings. In some of the countries surveyed, the database supporting the bankruptcy process also contains documents created within the accounting system. In Japan, for example, the verification mechanism requires debtors to furnish their own balance sheet and in France to present a financial statement. The law in Poland[1] requires debtors to submit selected elements of financial statements and other financial data based on subjective estimates to the court (Bauer 2014). Yet in view of studies that have demonstrated the paucity of economic knowledge about bankruptcy (Mączyńska 2008), and even problems with the quality of the financial information necessary to predict it (Wędzki 2012, p. 178), it is questionable whether the quality of the financial statements that form part of the database supporting the bankruptcy process is sufficient to support decision-making regarding the future of debtor companies.

Moreover, the way that existing accounting rules are applied means that the pictures companies project of themselves can be far from the economic truth (Mączyńska 2009, p. 51). That it is not possible to conduct a thorough evaluation of owner-occupied properties, which often causes significant distortion of information about the debtor's financial situation[2] has, for example, attracted considerable criticism. The law requires non-operational companies in bankruptcy proceedings to produce only a minimal amount of accounting information. This follows from the basic premise that the requirements to produce accounting information are tailored to the needs of companies continuing business operations, rather than attuned to the final phase of a company's life-cycle, even though this may last for several years[3] (Walińska & Jędrzejewski 2009, p. 165). It is noteworthy that the bankruptcy process in Poland means not only the loss of the ability to continue operating, but also the restructuring of companies seeking arrangement bankruptcies[4].

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[1] Bankruptcy and Reorganisation Act (2003), Restructuring Act (2015).

[2] See, for example, Kumor & Strojek-Filus (2011), Gawron (2012) and Bauer (2014).

[3] The average duration of bankruptcy proceedings in Poland is three years (Doing Business Report, available on-line at http://www.doingbusiness.org/data/exploreeconomies/poland#resolving--insolvency).

[4] Until the end of 2015 bankruptcy proceedings in Poland could be initiated with the intent to liquidate the assets of the insolvent debtor or to reach an arrangement with creditors. From 1 January 2016 the conduct of proceedings with the intent to make an arrangement, which in fact are restructuring proceedings, has been regulated by the Restructuring Act. However, bankruptcy proceedings initiated before the end of 2015 can be conducted in the same way as those intended to reach an arrangement with creditors. Due to the duration of the bankruptcy proceedings, insolvency proceedings leading to an arrangement are still an ongoing matter. In accordance

The information derived from financial statements can also be used to evaluate activities in periods preceding the filing of the bankruptcy petition and thus improve the court's decision-making process with regard to debtor companies.

The deliberations in this paper are based on the belief that, though a financial statement is not the only source of information on debtors during bankruptcy proceedings in Poland, the legitimacy of including the financial statement in the information database depends on it retaining features that enable that data to be understood.

The aim of this paper is to identify the legal conditions affecting the clarity of the information from financial statements, which may form a base for assessing the financial situation of debtors in the initial stage of bankruptcy proceedings. This paper also addresses the practical difficulties of implementing financial reporting legislation that must be negotiated by debtor companies that have begun bankruptcy proceedings in court. The study sets out first to enlarge our knowledge of the regulations affecting the clarity of financial statements and business activities of entities in bankruptcy, before proceeding to evaluate the current state of affairs and to suggest potential paths for change.

There are three phases to the study:

– a review of the literature on the qualitative characteristics of financial statements,

– an analysis of corporate financial reporting legislation relevant to companies in bankruptcy proceedings in Poland,

– empirical research conducted on a representative sample of enterprises in bankruptcy proceedings in Poland.

The study seeks answers to the following questions:

1) Does the Bankruptcy Act in Poland require debtors to provide financial statements that their readers can understand?

2) Does the practice of bankruptcy proceedings in Poland ensure the clarity of the information included in financial statements?

These questions have been prompted by the literature review and by the author's previous studies of the financial statements of entities in insolvency proceedings.

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with the empirical research it contains, this paper discusses the understandability of financial statements in bankruptcy proceedings begun before the end of 2015.

2. Understandability as a Qualitative Characteristic of Financial Statements

Numerous scientific studies, legal regulations and accounting textbooks refer to issues related to the qualitative characteristics of financial statements, which are mainly considered in the context of the usefulness of financial statements to investors. The major sources of direction and guidance for the material to be contained in financial reports are IFRS (IFRS 2014) and the *Conceptual Framework for Financial Reporting*[5], whose latest definition of the qualitative characteristics of useful financial information places less emphasis on understandability and instead stresses the following:

– relevance,
– faithful representation.

As far as relevance is concerned, the information received by users will have achieved this quality if it has predictive value, confirmatory value or both of these things. If we are thinking of faithful representation, though, we have in mind information that is complete, neutral and free of errors.

According to the new IFRS approach, the following characteristics are now of secondary importance:

– comparability,
– verifiability,
– timeliness,
– and understandability.

In its references to the "understandability of financial statements", the *Conceptual Framework for Financial Reporting* emphasises clarity and conciseness in the classification, characterisation and presentation of information. There is no requirement for this information to be understandable to all users, or even to all those with a good general knowledge of business.

According to Hendriksen and Van Breda (Hendriksen & Van Breda 2002) qualitative characteristics in accounting theory are defined as those that stand the test of time, that are commonly used by entities and are subject to verification. It was assumed that the information must have quality characteristics such as:

– relevance,
– credibility,
– use benefits that outweigh acquisition costs,
– understandability,
– comparability between companies.

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[5] See, for example, Ball (2006), Williams & Ravenscroft (2015) and Gebhardt et al. (2014).

In this reading understandability is tailored to the user. In this way advanced users receive the more sophisticated and comprehensive material they require and users with a lower level of accounting knowledge are presented with material that is more immediately accessible (Hendriksen & Van Breda 2002).

According to Micherda (Micherda 2014, p. 18), on the other hand: "the quality of information produced in accounting can be interpreted as a set of features which determine the ability to meet the requirements arising from the function accounting performs." In this approach, the following are the most important determinants of information quality:

– Is it feasible?
– Does it have cognitive value?
– Is it operative?
– Is it economical?

According to this classification, intelligibility is associated with cognitive value and depends on the structure of information. A desirable structure is one that meets the needs of management by combining information in sufficient detail and in relevant sections (Micherda & Świetla 2013, p. 44).

One of the postulates of the theory is the pursuit of ideal financial reporting, which should identify and evaluate all items properly so that the equity's book value reflects a company's value to shareholders, and the balance sheet value reflects the total value of an enterprise for both the shareholders and creditors (Grabiński et al. 2014, p. 204).

In the theory of accountancy the balance sheet, which is that part of a financial statement with the longest history, is still referred to as a "snapshot" of an enterprise that reflects a specific moment in time (Davies & Boczko 2005; Wędzki 2009, p. 51). At the same time research has confirmed that, despite the fair application of the law, the information contained in financial statements may not provide a true picture of a company's value or its individual assets (Alexander & Nobes 2007; Mączyńska 2009, Szczesny & Valentincic 2013, pp. 285–317; Bauer 2014). The figures presented in the balance sheet and in other parts of financial statements should therefore be supplemented with additional information and explanations.

Descriptive information can have a positive influence on the understandability of the information contained in financial statements. Yet producing reliable and relevant descriptive information for financial statements is not easy as it requires the preparation of a clear text that contains all of the relevant data. The effort is worth making, though, as

this information helps us to obtain a comprehensive picture of a company's financial situation (Krasodomska 2011, p. 103).

3. The Influence of Legal Regulations on the Understandability of Financial Statements during the Bankruptcy Process

3.1. The Information Needs of External Users during Bankruptcy

According to Hendriksen & Van Breda (Hendriksen & Van Breda 2002) one of the key elements of financial reporting is the proper definition of the information's target users.

Some narrow down these target groups to members of the board, while others include all members of the public. Though the *Conceptual Framework for Financial Reporting* specifies investors, lenders and other creditors as the main users of the information presented in financial statements, it does not exclude the possibility that financial statements may be a source of information for other parties, such as regulators and members of the public.

At different stages of bankruptcy proceedings the following are the target users of information presented in financial statements:

– during the initial phase: all creditors who have filed for bankruptcy,

– in actual proceedings: all creditors,

– throughout the bankruptcy proceedings: debtors and those at court who decide whether or not bankruptcy proceedings can be conducted (temporary supervisors/administrators, court experts, judges ruling on declarations of bankruptcy).

As they are in clear need of credible and reliable information on the financial condition of debtors, judges ruling on declarations of bankruptcy make up a specific group of external users. The questions they consider most often when making a decision are as follows:

– Are the debtor's assets sufficient to cover the costs of bankruptcy proceedings?

– To what extent are the debtor's assets sufficient to repay debts?

– Are the assets of greater value if sold? If so, is it more beneficial to declare bankruptcy and liquidate assets? Is the use value of assets higher and is restructuring a better solution?

The following are the minimum requirements for a financial statement to be useful and understandable to users during bankruptcy proceedings:

– a balance sheet, including information about assets throughout several cycles,

– an income statement, which gives information about the income and expenses incurred by the company in past cycles,

– additional information, defining accepted valuation principles.

The cash flow statement is a further valuable source of information because it contains data on actual cash flow which, especially where there is a threat of bankruptcy, is more important than the accrual recognition of revenues and expenses.

It is the opinion of Wędzki (Wędzki 2013, p. 452) that: "(…) a financial statement is not the only source of information about the financial condition. The question therefore arises of whether it actually contains useful financial data. Confirmation of the thesis that it does in fact contain such data is the widespread use of financial statements in the prediction of bankruptcy". A financial statement may thus act as a foundation for assessing whether a company can survive once restructuring is complete. It may also provide grounds for evaluating the board in the periods preceding the filing of the bankruptcy petition. If this is to happen, however, access to both complete financial data, and to additional information that enables users to understand the contents of financial statements, is required (Bauer 2009).

3.2. The Financial Reporting of Companies in the Process of Bankruptcy

There are two main stages in bankruptcy proceedings:
– declaration proceedings,
– actual proceedings.

Declaration proceedings begin when the debtor or creditor submits the bankruptcy petition and end with the court's decision to declare bankruptcy or dismiss the petition. A petition may be dismissed due to a lack of funds to conduct bankruptcy proceedings, because there are no groups to submit a petition or because the entity's financial state is not sufficiently poor to meet the criteria stipulated by the Bankruptcy Act for starting bankruptcy proceedings[6]. If the court decides to admit the bankruptcy petition, it has to decide whether the bankruptcy will lead to liquidation of assets or to an arrangement. The understandability of the data contained in financial statements is crucial when the decision to declare bankruptcy is under consideration.

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[6] According to Article 12 of the Bankruptcy and Reorganisation Act, the court may dismiss a bankruptcy petition if the delay in paying liabilities does not exceed three months and the sum of unexecuted liabilities does not exceed 10% of total assets.

A court's decision to declare bankruptcy is made based on information from:
– the bankruptcy petition,
– the reports of the interim court supervisor (if one has been appointed),
– the opinion of the court expert (if one has been appointed).

The bankruptcy act in force until the end of 2015 limited the requirements for financial statements submitted to a court with the petition for bankruptcy to a balance sheet prepared no later than 30 days prior to submitting the petition and – where debtors were applying for an arrangement bankruptcy – a cash flow statement for the previous twelve months[7]. Failure to submit the required documents with a petition did not, however, prevent the initiation of bankruptcy proceedings. Debtors could be exempted from the obligation to submit the balance sheet and cash flow statement to the court if they specified credible reasons for not attaching these documents to the petition and had proof of them.

The Bankruptcy Act determines the scope of accounting information included in the documentation accompanying the bankruptcy proceedings.

In summary, representatives of the law in bankruptcy proceedings may require the submission to court of the balance sheet and, in certain cases, the cash flow statement, only insofar as the debtor has no grounds on which to apply for an exemption from this requirement.

As there is no obligation to attach additional information to financial statements, it is open to question whether the contents of the balance sheet in bankruptcy proceedings can be understood by external users who do not have access to supplementary information.

For example, the balance sheet values do not in themselves provide information on what valuation principles have been applied. It must be presumed that debtors applying for bankruptcy leading to the liquidation of the assets of the insolvent debtor make their valuations in accordance with Art. 29 of the Accounting Act[8] on the assumption that business operations will not continue. That is: "the undertaking's assets are measured at net realisable selling prices no higher than their acquisition prices or manufacturing costs, less any accumulated depreciation or amortisation charges as well as impairment losses recognised so far".

By contrast, debtors applying for arrangement bankruptcy might expect to continue business operations – either in a significantly different area of

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[7] Article 23 of the Bankruptcy and Reorganisation Act of 28 February 2003.
[8] Accounting Act of 29 September 1994.

business or within the current scope – and therefore make the valuation in accordance with Art. 29 or Art. 28.

The valuation method according to Art. 28 applies to entities whose continued operation is not threatened. In this case, the valuation methods vary for different groups of assets. The implementation of the law does not therefore provide the necessary information on the valuation method used, and nor does it help in understanding the financial data.

The implementation of the provisions of the Bankruptcy Act may also affect the comparability of individual values over time, which is also connected to the understandability of the data included in financial statements. The threat of bankruptcy can cause dynamic changes in the scope of property and financial resources owned. Polish law stipulates the submission of a balance sheet prepared just for one day, not later than 30 days before the petition is submitted. Debtors are therefore not required to submit a balance sheet for another day, such as at the end of the fiscal year, at the same time. This approach restricts the capacity to understand the changes that have taken place over time and that have led to the filing of a bankruptcy petition.

In short, if debtors submit documentation for bankruptcy proceedings drawn up in strict accordance with the requirements of the Bankruptcy Law, they will not be providing information users with data regarding valuation rules, revenue amounts, costs and performance. Furthermore, users will not be in a position to compare quantified values over time. The financial statements accompanying bankruptcy proceedings are not adequate to the task of making a reliable assessment of a debtor's financial situation. Courts must therefore analyse other documents in order to make an evaluation. In this regard, the documents prepared by the interim court supervisor as grounds for the court to rule on declaring bankruptcy are:
– an estimate of debtors' assets (Bauer 2014),
– cost accounting for the bankruptcy proceedings (Bauer 2013).

4. The Practice of Financial Reporting in Bankruptcy Proceedings in Poland

4.1. Sample Selection

The research focused on the quality of financial statements as a component of databases supporting bankruptcy proceedings, with particular emphasis placed on their understandability. Records from 2011 of

100 cases of bankruptcy proceedings in which bankruptcy had been declared were examined.

Empirical research was carried out in four of the forty-six district courts conducting insolvency proceedings in Poland. These included courts in:

– Tarnów (3 cases),
– Warsaw (22 cases),
– Katowice (26 cases),
– Kraków (49 cases).

The courts in the study were selected with a specific aim in mind. The court in Tarnów belongs to the group of courts with the smallest number of declared bankruptcies, the courts in Katowice and Kraków have an average number and the Warsaw court, which deals with approximately 150 cases every year, has the largest number of declared bankruptcies in Poland. Though documentation for all of the available bankruptcy proceedings in Tarnow, Katowice and Kraków was obtained, the sample size remained insufficient. The documentation required to complete the sample was therefore obtained from the Warsaw court. The aim was to achieve a sample of 100 cases representative of the structure of the entire population of insolvent companies in Poland.

Double stratified selection of the research sample was applied according to the legal forms of the bankrupt enterprises during the research period. The following legal forms were represented in the sample:

– 70 limited liability companies,
– 13 individuals engaged in economic activities,
– 7 joint-stock companies, 4 registered partnerships,
– 6 other forms of economic activity, such as limited partnerships and cooperatives.

The proportion according to legal forms of the enterprises in the research sample is similar to that of the total insolvencies declared in the 2011 Report (2012).

At the same time, the sample selection was made in accordance with the type of insolvency proceeding. The sample comprises:

– 16 cases of arrangement bankruptcy,
– 84 cases of proceedings leading to the liquidation of the debtor's assets.

The sample size corresponds to 14% of all insolvency cases in 2011 and is fundamentally representative of the phenomenon in Poland.

The research results presented here are part of a project concerning the limitations on, and potential for, using information from enterprises' accounting documents in bankruptcy proceedings.

4.2. Research Results

Due to the research topic, which is the understandability of the financial statements at the stage of deciding a company's future, the empirical studies documented the bankruptcy process from the date of filing for bankruptcy to the date of declaring it.

Close attention has been paid to the particular elements of the financial statements included in the information database supporting the bankruptcy proceedings.

Table 1. Elements of Financial Statements in Bankruptcy Proceedings Documentation

Elements of a financial statement	% of cases
Balance Sheet, including:	93
– drawn up on a day not later than 30 days prior to submission of petition	84
– drawn up at the end of the fiscal year (submitted with petition)	71
– drawn up on a different day	35
Statement of Cash Flows, included in:	11
– case files relating to requests for proceedings leading to an arrangement	8
– case files relating to requests for liquidation of assets	3
Introduction to financial statements, including:	21
– information on the going concern assumption	17
Profit and Loss Account	78
Statement of Changes in Equity	2

Source: author's own study.

The research found that:

– in 93% of cases, in accordance with the Bankruptcy Act, a balance sheet had been drawn up and submitted not later than 30 days prior to filing a petition. In only one case was a balance sheet not submitted with a debtor's petition. In the remaining cases in which a balance sheet had not been submitted it was because the bankruptcy petition had been filed with the court by a creditor,

– the case in which a court found and challenged a significant difference between assets and liabilities deserves particular attention,

– a cash flow statement was submitted in 11% of cases, including three cases in which the petitions were filed by debtors intending to initiate asset--liquidation proceedings,

– most debtors submit more elements of financial statements than required by law. A profit and loss account was included in 78% of cases, financial statements information was included in 19% of cases and a statement of changes in equity in 2% of cases,

– in two cases the introduction to the financial statements did not contain any information on the rules adopted concerning the continuation of business operations,

– special attention is merited by three cases in which debtors filed for asset-liquidation bankruptcy, but in the introduction to the financial statement stated that the application had been drawn up assuming the business would remain a going concern within the same scope of business for the foreseeable future,

– though debtors submitted more elements of financial statements than required by law, comparable value over time was relevant in 24% of cases. This was observed particularly in cases where a bankruptcy petition was submitted in January and was therefore accompanied by a financial statement, or selected parts of a financial statement, for the fiscal year just ended and for the previous fiscal year. In two cases, debtors who were trying to ensure comparability over time submitted profit and loss accounts for the same period of time (less than a year) for two consecutive years.

In summary, though the Bankruptcy Act greatly minimises the requirements placed on financial statements in bankruptcy proceedings, debtors expand the scope of the accounting documentation about their enterprises that they submit to court.

Additional sections of financial statements had in some cases been added to the court supervisors' interim reports. While court supervisors do not rely on accounting principles when preparing reports required by law, their analyses are more credible for taking these additional sections of financial statements into account.

The current state of affairs should be considered valid from the point of view of implementing the law. The fact that the information database supporting bankruptcy proceedings includes a wider range of accounting documents than required by the Bankruptcy Act is also a positive factor. It is unsatisfactory, however, that the cases in which comparisons are made over time, and in which it is possible to obtain information on the rules adopted to prepare financial statements, depend on the "goodwill" of the parties involved in the bankruptcy proceedings instead of on the law, which should be construed so as to guarantee the delivery of accurate information on the financial situation of debtors.

Despite debtors' voluntary submission of a larger number of financial statements than required by law, it cannot be stated that the understandability of the content of financial statements is in practice guaranteed.

5. Conclusion

The Bankruptcy Act imposes only minimal requirements for the financial statements companies submit to court with a petition for bankruptcy. Users are thus deprived of information from case files, of reliable information on the balance sheet valuation method used to evaluate the debtor's assets, and of information on the costs, results, and revenues generated during the periods preceding the filing of the bankruptcy petition.

The study revealed that, despite the modest legal requirements regarding the financial statements of companies petitioning for a declaration of bankruptcy, most debtors volunteer more elements of financial statements than are required by law. The reason for this may lie in the characteristics of accounting, that is, in the perception that financial statements are a source of reliable information on the assets and financial condition of a company and, as such, may have a profound effect on courts' decisions to declare bankruptcy. The reason companies filing for a declaration of bankruptcy exceed the statutory requirements with regard to sections of financial statements may also be connected with the type of bankruptcy proceedings used. There may be a variety of reasons – other than ethical ones – for attempting to make information about a company's condition credible. Yet the availability of more information about the condition of companies in the form of additional sections in financial statements is to be regarded as positive at the present stage of research.

Though the satisfactory implementation of the Bankruptcy Act's requirements for the submission of financial statements to court, and debtors' attempts to exceed the legal requirements for the information they present, should be emphasised and noted, it must be stated clearly that neither the provisions of the Bankruptcy Act, nor the practice of bankruptcy proceedings in Poland, have brought understandability to the financial statements included in court files for bankruptcy proceedings. Instead, the court must rule in bankruptcy cases by reference to information from other sources.

The law should make provision for the understandability of financial statements in the insolvency process by ensuring that more sections from them, and especially the notes, are made available. Understandability also requires the comparability of data over time, which can be accomplished by

submitting comparative data for periods preceding the application to the courts. Having said this, the changes which were introduced in 2016 point to further marginalisation of the role of accounting information in liquidation and restructuring proceedings (Bauer 2015).

The present paper represents a preliminary investigation of the potential for introducing the principles of understandability to financial statements in bankruptcy proceedings. It is hoped that future research will extend this perspective 1) by addressing the satisfaction of all of the criteria for the usability of financial statements published by companies in bankruptcy proceedings and 2) by considering a new type of judicial process: restructuring.

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Abstract

Zrozumiałość sprawozdań finansowych w procesie podejmowania decyzji w postępowaniu upadłościowym

Sprawozdanie finansowe jest jednym ze źródeł informacji o sytuacji finansowej przedsiębiorstwa. O jego wartości informacyjnej świadczy fakt, że jest powszechnie wykorzystywane w predykcji upadłości. W wielu krajach sprawozdanie finansowe lub jego elementy stanowią część bazy informacyjnej procesu upadłościowego. Celem artykułu jest analiza teoretycznych i praktycznych aspektów związanych z wykorzystaniem sprawozdania finansowego jako źródła informacji w procesie upadłościowym na etapie podjęcia decyzji o dalszych losach przedsiębiorstwa dłużnika. Badania aktów prawnych oraz empiryczne przeprowadzono w czterech z 46 sądów prowadzących postępowania upadłościowe w Polsce. W wyniku przeprowadzonych badań stwierdzono, że na obecnym etapie ani regulacje prawne, ani praktyka sądowa nie zapewniają zrozumiałości treści zawartych w sprawozdaniach finansowych w postępowaniach upadłościowych.

Słowa kluczowe: bankructwo, upadłość, zrozumiałość sprawozdań finansowych, jakość sprawozdań finansowych.