

STATISTIKA

STATISTICS
AND ECONOMY
JOURNAL

VOL. **95** (3) 2015

EDITOR-IN-CHIEF

Stanislava Hronová

Prof., Faculty of Informatics and Statistics,
University of Economics, Prague
Prague, Czech Republic

EDITORIAL BOARD

Iva Ritschelová

President, Czech Statistical Office
Prague, Czech Republic

Marie Bohatá

Vice-President, Eurostat
Luxembourg

Ludmila Benkovičová

President, Statistical Office of the Slovak Republic
Bratislava, Slovak Republic

Roderich Egeler

President, German Federal Statistical Office
Wiesbaden, Germany

Richard Hindls

Deputy chairman of the Czech Statistical Council
Prof., Faculty of Informatics and Statistics,
University of Economics, Prague
Prague, Czech Republic

Gejza Dohnal

Vice-President of the Czech Statistical Society
Czech Technical University in Prague
Prague, Czech Republic

Štěpán Jurajda

Director, CERGE-EI: Center for Economic Research
and Graduate Education — Economics Institute
Prague, Czech Republic

Vladimír Tomšík

Vice-Governor, Czech National Bank
Prague, Czech Republic

Jana Jurečková

Prof., Department of Probability and Mathematical
Statistics, Charles University in Prague
Prague, Czech Republic

Jaromír Antoch

Prof., Department of Probability and Mathematical
Statistics, Charles University in Prague
Prague, Czech Republic

Martin Mandel

Prof., Department of Monetary Theory and Policy,
University of Economics, Prague
Prague, Czech Republic

František Cvengroš

Head of the Macroeconomic Predictions Unit,
Financial Policy Department,
Ministry of Finance of the Czech Republic
Prague, Czech Republic

Josef Plandor

Department of Analysis and Statistics,
Ministry of Industry and Trade of the Czech Republic
Prague, Czech Republic

Petr Zahradník

ČEZ, a.s.
Prague, Czech Republic

Kamil Janáček

Board Member, Czech National Bank
Prague, Czech Republic

Vlastimil Vojáček

Executive Director, Statistics and Data Support Department,
Czech National Bank,
Prague, Czech Republic

Milan Terek

Prof., Department of Statistics,
University of Economics in Bratislava
Bratislava, Slovak Republic

Cesare Costantino

Former Research Director at ISTAT and UNCEEA member
Rome, Italy

Walenty Ostasiewicz

Prof., Department of Statistics,
Wroclaw University of Economics
Wroclaw, Poland

EXECUTIVE BOARD

Jakub Fischer

Vice-Rector, University of Economics, Prague
Prague, Czech Republic

Luboš Marek

Dean of the Faculty of Informatics and Statistics,
University of Economics, Prague
Prague, Czech Republic

Marek Rojíček

Vice-President, Czech Statistical Office
Prague, Czech Republic

Hana Řezanková

President of the Czech Statistical Society
Prof., Faculty of Informatics and Statistics,
University of Economics, Prague
Prague, Czech Republic

MANAGING EDITOR

Jiří Novotný

Czech Statistical Office
Prague, Czech Republic

FOREWORD

Dear Readers,

The journal of Statistika has been celebrating 95th anniversary of its original establishing this year. Upon this occasion I would like to express my thanks to you for your continuous favour for this quarterly periodical of the Czech Statistical Office.



In fact, there are very few professional journals in the Czech Republic, which may refer to such a long tradition. The journal of Statistika, in its current form, has been issued as early as since 1964 following the tradition of the Československý statistický věstník (Czechoslovak Statistical Bulletin), established back in 1920. In the period 1931 to 1961 the journal was called Statistický obzor (Horizons of Statistics) and then in a short period (1962–1963) was named Statistika a kontrola (Statistics and Control).

The Journal withstood all the turns and essentially changing conditions in history. Over these years it has become a truly valuable heritage of the Czech Statistical Office. The heritage, which is carefully looked after by the Editorial and Executive

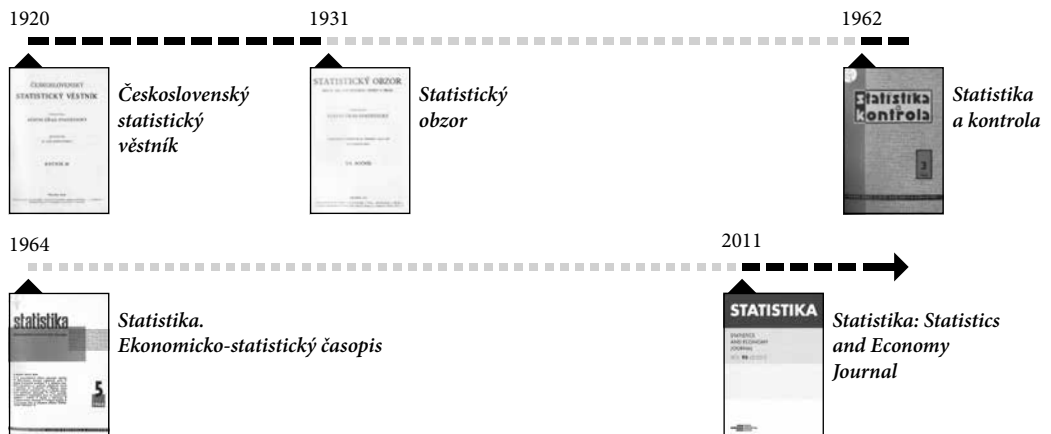
Boards with the objective to strive for its quality and development. Therefore we are proud of the fact that this year the journal of Statistika was accepted into Scopus, the international abstract and citation database of peer-reviewed literature, as a sign of recognition of these continuous efforts.

Since 2011 the journal has been issued in English only. The total of 130 professional and scientific papers has been published since then. The share of foreign papers has also been growing steadily. In the last period their share has exceeded half of all published articles. The overall professional level and quality of the journal has been growing accordingly.

I believe that these trends will be even more intensive in the future. We are looking forward to further cooperation with authors whose papers bring results of analyses in the fields of economy, environment, or social sciences and reflect the official statistics as an instrument supporting decision making processes at all levels. We also greatly acknowledge our readers' attention and support through all these years.

Iva Ritschelová

President of the Czech Statistical Office



CONTENTS

ANALYSES

- 6 Václav Rybáček**
How to Stabilize Debt while Running Deficit
- 16 Tereza Vavřinová, Anna Krčková**
Occupational and Sectoral Mobility in the Czech Republic and its Changes during the Economic Recession
- 31 Adrian Otoiu, Emilia Titan**
Seeing the Hidden Part of the Iceberg: Gauging the Real Dimension of International Migration
- 39 Elena-Maria Prada, Costin-Alexandru Ciupureanu, Adrian Otoiu**
A Regional Analysis of Romanian Migration Determinants

METHODOLOGY

- 48 João Cadete de Matos**
Reaping the Benefits of Using Integrated Micro-Data for Statistical Purposes... and Beyond

INFORMATION

- 55 Roland Sturm**
Revised Definitions for Statistical Units – Methodology, Application and User Needs. The Main Conceptual Issues of the “Units Discussion” of the Years 2009–2014
- 64** Publications, Information, Conferences

About Statistika

The journal of Statistika has been published by the Czech Statistical Office since 1964. Its aim is to create a platform enabling national statistical and research institutions to present the progress and results of complex analyses in the economic, environmental, and social spheres. Its mission is to promote the official statistics as a tool supporting the decision making at the level of international organizations, central and local authorities, as well as businesses. We contribute to the world debate and efforts in strengthening the bridge between theory and practice of the official statistics. Statistika is professional double-blind peer reviewed journal included (since 2015) in the citation database of peer-reviewed literature Scopus and also in other international databases of scientific journals. Since 2011 Statistika has been published quarterly in English only.

Publisher

The Czech Statistical Office is an official national statistical institution of the Czech Republic. The Office main goal, as the coordinator of the State Statistical Service, consists in the acquisition of data and the subsequent production of statistical information on social, economic, demographic, and environmental development of the state. Based on the data acquired, the Czech Statistical Office produces a reliable and consistent image of the current society and its developments satisfying various needs of potential users.

Contact us

Journal of Statistika | Czech Statistical Office | Na padesátém 81 | 100 82 Prague 10 | Czech Republic
e-mail: statistika.journal@czso.cz | web: www.czso.cz/statistika_journal

How to Stabilize Debt while Running Deficit

Václav Rybáček¹ | Jan Evangelista Purkyně University, Ústí nad Labem, Czech Republic

Abstract

Main aim of the paper is to discuss the relation between government deficit and debt and the importance of the aggregate known as stock-flow adjustments. The development of Czech government's debt confronted with deficits in the last years gave raise to a number of questions which are dealt with in the following text, mainly the way how debt can be stabilized or even decreased if budget balance ends up regularly in huge deficits. The second task addressed in the text is the case of the net debt concept. Net debt is presented primarily not as alternative to EDP debt, but rather as supplementary indicator making the picture on fiscal situation more complete. In the last part, the characteristics of EDP debt and net debt are discussed; the development of both indicators is then compared using the figures published for the Czech Republic.

Keywords

Government, deficit, debt, stock-flow adjustment

JEL code

H10, H62, H63

INTRODUCTION

Recent development of deficit and debt in the Czech Republic brought into light the question of mutual relation between these fiscal indicators. A decline in debt concurrently with rising deficit is considered to be against the intuitive logic that a lack of resources is to be financed by borrowings from other economic sectors; in other words, that running deficit automatically implies rising indebtedness. Changes in debt are driven purely by deficits only if there are no other factors having impact on the changes in debt; these factors are discussed in the following paragraphs.

The situation in public finance is usually monitored through Maastricht deficit and debt indicators, which are presented mostly in relative terms, i.e. compared to nominal GDP. Rising (or declining) nominal level of GDP lowers (increases) the levels of both deficit and debt. Thus, changing nominal level of GDP can be left aside as a factor explaining potential deviation between the development of deficit and debt. So, to make following discussion and its conclusions clearer we will discuss the mutual relation between absolute values of deficit and debt.

From the methodological point of view, the following analysis is based on the indicators compiled according to the methodology ESA2010. Before proceeding to the analysis it is worth to mention that there is a number of methodological differences between State budget and State debt and the fiscal indicators utilized in the Excessive Deficit Procedure whose mutual relation will be analyzed in the following paragraphs (i.e. Maastricht criteria).² However, the logic of mutual relation between EDP deficit and debt is akin to that presented by the ministry of finance between State budget balance and State debt.

¹ Czech Statistical Office, Na padesátém 81, 100 82 Prague 10, Czech Republic. E-mail: vaclav.rybacek@czso.cz.

² For more details on these differences see: Vebrova, Rybacek (2014).

1 STICKING TO THE RULES AND THE BEHAVIOR OF GOVERNMENTS

The Maastricht criteria are widely used for public finance management and its monitoring by analysts as well as general public. The introduction of the Maastricht criteria had the ambition to avoid hazardous behavior of the EMU members to run deficit and debts due to the expectation that costs of resulting inflation will be spread among all monetary union members. On the other hand, the need to meet the ceiling of deficit and debt had created certain kind of incentives for government to apply a creative accounting. Number of studies has attempted to explain the impact of the fiscal rules on the behavior of governments and changing relation between deficit and debt in the last decades.

Milesi-Ferretti and Moriyama (2004) using balance sheet approach found out that countries running up EMU were shifting fiscal activities from restricted to non-restricted instruments. This trend has been accompanied by significant decumulation of assets with no effect on the real fiscal position. This shows not only changing behavior after the introduction of fiscal rules, but also a certain insufficiency of EDP debt concept due to its limited view only on gross value of government liabilities. Decumulation of assets as a reaction to the need to take fiscal measures is also confirmed by Easterly (1999).³

That (gross) definition of EDP debt gives rise to room for accounting tricks is further confirmed by Hagen and Wolff (2004). According to the authors, a systematic relation between deficits and changes in debts can be found after the introduction of fiscal rules. In other words, there is an evidence of a creative accounting shifting deficits to so-called stock-flow adjustment reconciling deficits with the changes in debt.

Blejer and Cheasty (1991) objected that fiscal rules are applied to the measurable fiscal aggregates, however, the question whether are they economically meaningful remains quite open. Hagen and Wolff (2004) consider the extent of stock-flow adjustments as an indication of a creative accounting. As creative is considered a situation in which an improvement in fiscal balance does not imply positive changes in the government net worth. However, it should be noted that rapidly developing methodology of government statistics continuously addresses wider range of methodological issues making the delimitation of relevant aggregates stricter.

In the following text, we will analyze the behavior of the Czech government over the last almost 20 years with more detailed focus on data for the last four years. As shown, the decumulation of assets as a tool how to make the debt statistics more favorable has been used in the Czech Republic in the last years. At the same time, behavior of the Czech governments before and after the joining the European Union and its potential change will be analyzed as well.

2 CHANGES IN DEFICIT AND DEBT OVER TIME

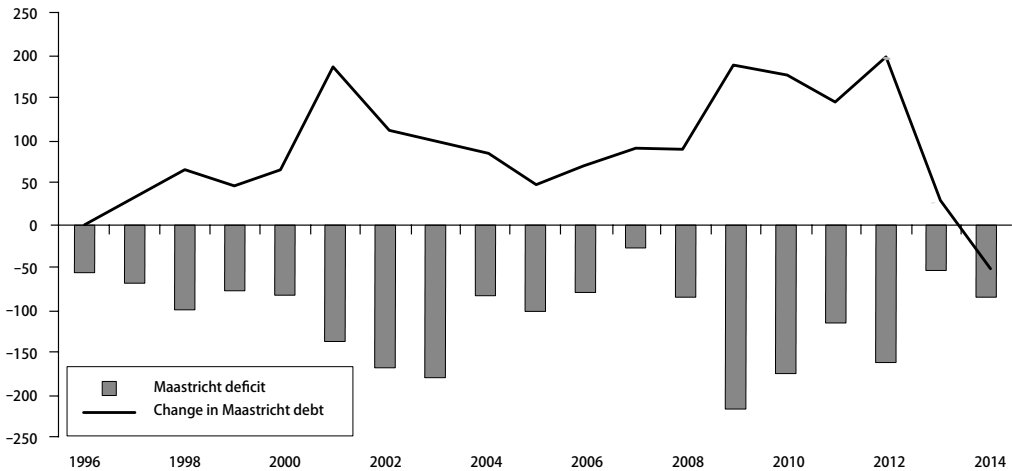
Following chart provides an overview of the currently published data on Maastricht deficit and changes in the value of Maastricht debt. As it is evident, in years 1996 or 2014 the deficit was accompanied by declining debt. Moreover, it can be drawn from the chart that the extent of changes was different in number of years, thus the change in debt has been evidently driven not only by deficit in given years but other factors have contributed to this development.

The relationship between deficit and debt can be formalized in the following way:

$$D_{(t+1)} = D_{(t)} - BB_{(t+1)} + SFA_{(t+1)}, \quad (1)$$

where D represents a nominal level of debt at the end of period “ t ”, BB signifies balance of budget and SFA stands for stock-flow adjustments. According to the formula, a nominal level of debt at the end of year

³ In form of privatization or crude oil production, etc.

Figure 1 Maastricht deficit and changes in the debt, the Czech Republic, mill. CZK

Source: www.czso.cz

($t+1$) shows the impact of the level of debt at the end of previous year (t) further influenced by the balance of revenues and expenditures in year ($t+1$) and by a number of factors grouped in the aggregate SFA.⁴

The relation between SFA and changes in debt can be summarized as follows:

SFA = 0, then change in debt corresponds to deficit/surplus (BB),

SFA > 0, then a rise in debt exceeds deficit or a decrease in debt is less than surplus,

SFA < 0, then a rise in debt is lower than deficit or a decrease in debt exceeds the surplus.

The aggregate SFA is crucial for understanding of existing deviations in the development of deficit and changes in debt. SFA comprises the influence of net financial transactions carried out with financial instruments, revaluation of these items and also other changes in volume of debt instruments. For now, we leave aside the case of other changes in volume whose impact on the level of debt is usually avoided by the statistical offices so that they are zero or negligible.

In the case of revaluation, its importance depends mainly on the structure of currencies in which debt is denominated and the level of contractual exchange rates if debt instrument issued by government institutions in foreign currency is hedged against exchange rate risk. It is worth to mention in this respect that changes in the market prices of government debt securities do not affect the nominal level of Maastricht debt. The reason is the fact that nominal debt is valued at nominal values instead of market prices.

One of the most important adjustments recorded under SFA reflects the fact that governments issue debt securities above or below the face value. The difference between issue price and par value thus represents an important part of reconciliation between deficit and debt as recorded in the notification table (table 3 in the set of the notification tables). The same holds true in the case of early redemption or buy-back operations with government bonds carried out by government (as the issuer). It is evident

⁴ Contributions of relevant factors to changes in debt of government sector are indicated in the table 3A of notification table which are transmitted and published by the Czech Statistical Office twice a year.

that adjustments resulting from revaluation can have potentially significant impact on the differences between deficit/surplus and change in debt as defined for the EDP purposes.

The last group of factors is represented by so-called financial transactions which are recorded in financial account within national accounts. Financial transactions usually drive the course of the aggregate SFA the most as can be drawn from table 3 in the notification tables. From national accounts perspective, financial transactions must be conceptually distinguished from non-financial transactions forming budget balance (BB). One of the main differences between both types of transactions is their impact on balance sheet. Transactions recorded only in the financial account (pure financial transactions) do not lead to a change in the net worth. However, this does not apply to non-financial transactions except for those related to accumulation of non-financial assets recorded in the capital accounts (acquisition of non-financial assets).

To show this conceptual difference, we can put the privatization of public companies as an example. If government decides to sell its share in a company, this decision is considered as a pure change in portfolio, i.e. reduction in holding of shares and increase in deposits without any impact on net worth. On the contrary, any payment of interests is taken as distributive (non-financial) transaction linked to financial transaction and causing a decrease in the net worth.

Generally speaking non-financial transactions have their counterparties in financial accounts,⁵ i.e. they are linked to transaction with one of the financial instruments. The financial account consists of eight instruments structured by liquidity;⁶ large part of these instruments does not represent highly liquid assets counted in the monetary aggregates M1 or M2, but takes the form of less or low liquid assets as insurance technical reserves or (and especially) other accounts payable or receivable. It implies that non-financial transactions (payment of interest, purchasing of services, etc.) do not inevitably result in cash outflow or inflow, and that the level of debt instruments is not automatically influenced by non-financial transaction.

To be concrete, non-financial transactions are very often *inter alia* connected with a transaction in financial instrument referred to as “other accounts payable” or “other accounts receivable”. As an example the church restitutions can be mentioned – financial compensation amounting to CZK 59 bil., respectively. This expenditure has been accounted for in 2012 without any impact on neither indebtedness nor holding of cash. In fact, this expenditure gave rise to the transaction in other accounts payable (AF.8) not counted in the amount of total debt.

The financial compensation has affected the relation between debt and deficit expressed by the formula (1) in the following way (in CZK mil.):

$$\begin{aligned} D_{(t+1)} &= D_{(t)} - BB_{(t+1)} + SFA_{(t+1)} \\ D_{(t+1)} - D_{(t)} &= BB_{(t+1)} + SFA_{(t+1)} \\ 0 &= +59 - 59 \end{aligned}$$

This clearly illustrates that budget balance deficit (–BB) caused by the compensation has not been covered by transactions in debt instruments, but this expenditure amounting to CZK 59 bil. has been “financed” by transaction in non-debt instruments (–SFA) as other accounts payable (AF.8). We can conclude that from the perspective of debt statistics financial transactions can be divided into those having impact on debt and financial transactions with items not counted in total debt, i.e. with no impact on debt.

⁵ Except rare cases of barter, etc.

⁶ Monetary gold and special drawing rights (AF.1), currency and deposits (AF.3), debt securities (AF.3), loans (AF.4), equity and investment fund shares or units (AF.5), insurance, pension and standardized guarantee scheme (AF.6), financial derivatives and employee stock options (AF.7), other accounts payable/receivable (AF.8).

So, we can come to the general finding that any change in debt can be caused by transactions recorded in either BB or SFA. Due to the linkage of both aggregates, an inappropriate distribution of transactions carried out by government is automatically transferred to the other aggregate with the opposite sign. Main aim of statisticians is then to avoid such a situation and to record each transaction correctly in line with the currently applied methodology.

However, there is an ongoing debate on which transaction should have an impact on BB and which should be treated as pure financial transactions. The attention is paid mainly to capital injections, i.e. subsidizing of loss making public companies in various forms – cash, purchasing of shares, etc. Even if these transactions can be referred to as purchasing of shares in the accounting or budgetary systems (SFA = 0), in fact they represent provision of financial assistance (BB<0, SFA>0). Other important topic, so-called concept of super-dividend, is of a similar nature. Although receiving of dividends is generally treated as transaction positively impacted BB, if the transfers exceed a profit in previous year it is partly recorded as pure financial transaction (worsening in BB, increase in SFA).

3 “CONTRADICTION” CHANGES IN DEFICIT AND DEBT, EXAMPLES

Distinguishing between financial and non-financial transactions can lead to different trends in the development of deficit and debt. This can be clearly illustrated in some years. In 2012, the rise in debt significantly exceeded the need for deficit financing. In the system of national accounts, cash inflow raised by bond issuances (rise in liabilities) has been retained on deposits (rise in assets) except a part used to cover existing lack of revenues. As a result, “excessive” issuance has led to the accumulation of assets (reserves).

By use of the formula mentioned above, we can demonstrate the situation at the end of 2012 formally as follows:

$$1\ 803\ 585\ (D_{(t+1)}) = 1\ 604\ 009\ (D_{(t)}) + 157\ 889\ (BB_{(t+1)}) + 41\ 687\ (SFA_{(t+1)})$$

Despite of quite massive issuance of debt securities, the amount of SFA seems to be surprisingly low. However, it should be kept in mind that large part of the deficit in 2012 has been “financed” by transactions with other financial instruments, notably transaction recorded under the item other accounts payable. That was the case of church restitutions, as mentioned above, and the correction of EU subsidies. Both exceptional transactions have negatively impacted the aggregated SFA through transaction with other accounts payable (AF.8). Taking this into account, the accumulation of cash from “excessive” emissions significantly exceeded the level of SFA.

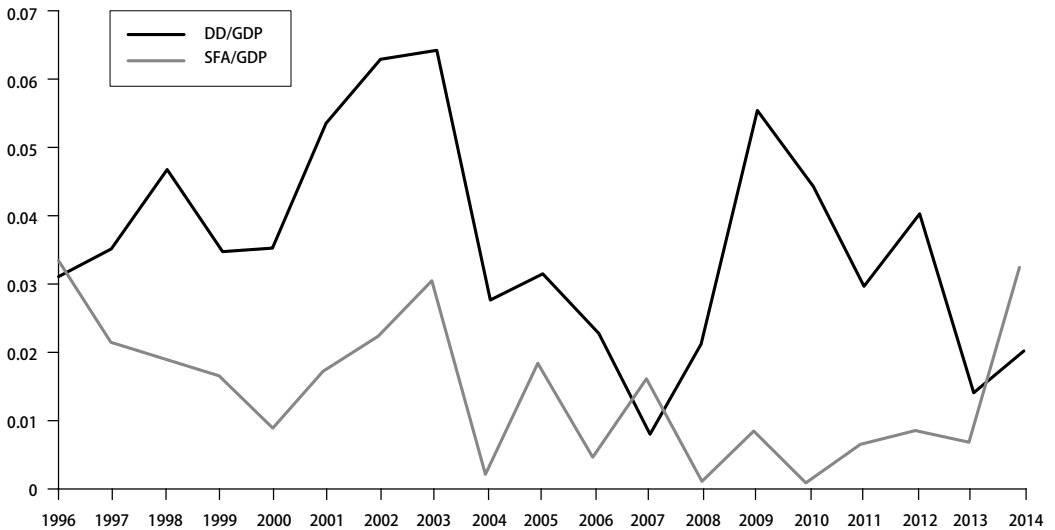
The opposite case has happened in the year 2014 when deficit was financed by the decrease in assets accumulated in the previous years (deposits) and by transaction in the cash-pooling system operated by the central bank. To use the formula (1), it can be stated:

$$1\ 816\ 137\ (D_{(t+1)}) = 1\ 839\ 726\ (D_{(t)}) + 84\ 558\ (BB_{(t+1)}) - 108\ 147\ (SFA_{(t+1)})$$

Reduction in debt with simultaneously rising deficit has been reached by engagement of liquid assets; this observation is clearly represented by high transaction in SFA (–108 147). Decrease reported in the aggregate SFA has been dominantly caused by reduction in holding deposits. In other words, lack of revenues (deficit) and decrease in debt has been financed by drawing the deposit balances.

This development has been enabled by reserves accumulated in the previous year and by the intensive use of cash in the cash-pooling system.⁷ The following chart shows the development of DD and SFA expressed as a percentage of GDP.

⁷ Cash-pooling represents the way the liquidity is managed within a group of units; in reality, these units share their deposits for the purpose of cash-flow optimization within the group. According to law, the central government can manage the deposits of some other institutions.

Figure 2 Share of DD and SFA on GDP, the Czech Republic, 1996–2014

Source: www.czso.cz

The value of SFA exceeded DD in three years (1996, 2007 and 2014). In 2007, the subsectors of local government institutions and health insurance companies reached high surpluses resulting in the accumulation of assets. At the same time, significant part of revenues of the central government institutions from bond issuances was held in form of financial assets.

It should be mentioned that before 2004 not insignificant part of deficit has been covered by the transaction with SFA due to transformation of the Czech economy.⁸ Nevertheless, the importance of SFA has been rather decreasing after 2004 implying that SFA has not been used as “a creative tool” to meet the fiscal rules (Easterly, 1999). However, especially from 2011 onwards, SFA has again gained its importance in the explanation of the relation between deficit and changes in debt.

4 NET DEBT

As has been shown, the assessment of SFA should be considered as necessary component of the analysis of Maastricht criteria. The importance of SFA is strengthened by the gross nature of EDP debt, i.e. it is defined as a sum of selected items only on the liability side of balance sheets. This approach has its serious limitations. It does not refer to actual financial position of government because a given level of debt does not carry information whether government faces liquidity problems or on the position of government on the financial market. Moreover, official value of debt does not give an indication whether government is able to service its debt without further borrowing due to accumulated assets or whether government is able to keep on financing the expenditures in time of limited access to the financial market.

Current approach to debt has evidently its limitations which could be overcome by either change in definition itself or by supplementing with other indicator. One of these alternatives is the net debt concept. The concept of net debt is considered to provide from some perspectives a more relevant (supplementary) information on financial situation of the government, debt sustainability and fiscal risks

⁸ We mean mainly transaction of the transformation institutions, privatization receipts, etc.

(Dipplesman, Dziobek, Mangas, 2012); it can be used by analysts, policymakers or rating agencies to assess the solvency of government and for other purposes.

The definition of net debt still remains quite open question. Generally, the indicator of indebtedness on the “net” basis is affected not only by the amount of given liabilities but also by the value of selected assets held by government institutions. The first step is to select appropriate assets reducing the amount of gross debt to net debt concept. This issue is discussed later in the text; for this moment we take into account the corresponding items on the asset (currency and deposits, debt securities and loans); this approach is in line with the manuals GFS2014 and the Manual on government deficit and debt.

Table 1 Structure of balance sheet of government institutions, the Czech Republic, 2014, bil. CZK

| Balance sheet of government institutions (bil. CZK) | | | |
|--|---------------------------|--------------------------------|-----------------------------------|
| | Assets (market values) | Liabilities (market values) | Liabilities (EDP, face values) |
| Non-financial assets | 12 809 698 | | |
| Financial Assets/Liabilities | 1 707 246 | 2 435 376 | 1 816 137 |
| Currency and deposits | 376 784 | 9 974 | 9 958 |
| Debt securities | 194 325 | 1 883 491 | 1 624 566 |
| Loans | 135 839 | 183 405 | 181 613 |
| Equity and investment fund shares or units | 807 864 | | |
| Insurance, pension and standardized guarantee scheme | 2 959 | 11 283 | |
| Financial derivatives and employee stock options | 408 | 4 681 | |
| Other accounts receivable | 369 559 | 342 542 | |

Source: www.czso.cz

The following Table 1 shows the balance sheet of the Czech government institutions at the end of 2013 whereas selected liability items are shown valued at market prices (creditor approach applied in ESA) and at nominal values (debtor approach applied in EDP).

We can draw from the table that government institutions own mainly non-financial assets (buildings, roads, mineral resource, lands, etc.). Non-financial assets can be exploited as financial source, i.e. non-financial asset can be deliberately converted into cash if sold on the market; however from the historical perspective this is quite rare case occurring mainly in time of financial distress. If non-financial assets are sold to raise cash, this has a positive impact on the aggregate BB.

Minor part of total assets is held in form of financial instruments, mainly currency and deposits and shares. Currency and deposits are considered as the most liquid assets and they are to be counted in net debt. Debt securities and loans have their counterparty on the liability side in gross debt, thus will be also taken into account for net debt quantification. However, the case of debt securities valuation should be kept in mind due to different valuation method. Different approaches are clearly shown

on the liability side in Table 1. While the value of debt securities at market prices has reached CZK 1 883 billion, for the EDP purposes the value of debt securities has been CZK 1 625 billion. Non-negligible difference is caused by many factors especially the credibility on the financial market, government bonds interest rates and by overall situation on the bond market.

The following chart shows the development of EDP debt and net debt over time in the Czech Republic.

It should be admitted that this comparison is just an approximation mainly due to slight differences between the valuation methods. Whilst EDP debt is valued at face values, i.e. market value and accrued interest are both eliminated;⁹ items on the asset side are preferably valued at market prices if these are observable or can be reliably estimated. Mainly value of debt securities can be to some extent affected by market prices or interest accrued whereby the latter can more or less influence the value of all items counted in net debt indicator.

Nevertheless, comparison between assets valued at market prices and liabilities at face value can be theoretically justified. On the liability side, it shows real financial position of government because face value carries the information on the obligation at the maturity. On the asset side, the value of bonds at market prices shows the amount of money which can be gained on the market by selling assets to repay debts which are to be repaid.¹⁰ However, it could be objected that market prices (at which assets are valued) are only a matter of history. Especially in time of crisis and asset prices fluctuation, actual situation can change very quickly affecting the solvency of government.

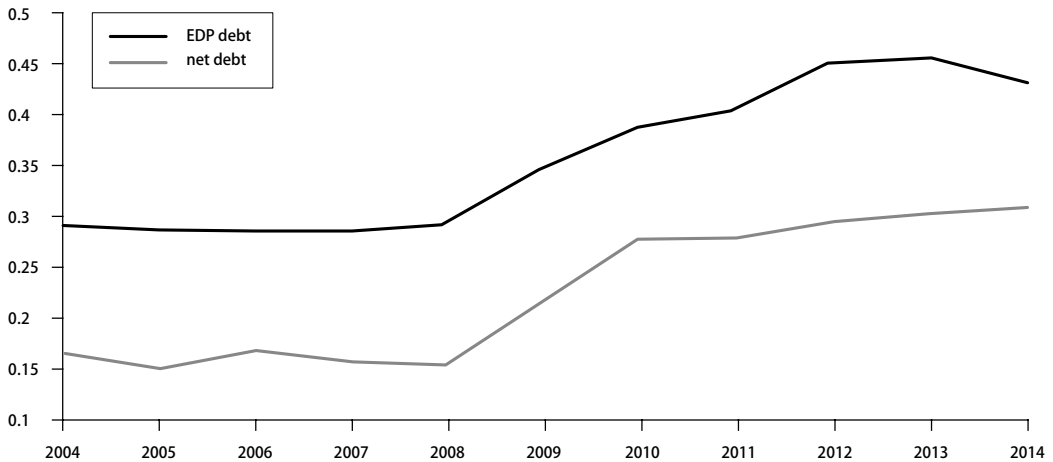
As can be seen in the Figure 3 both indicators show similar (rising) trends from the very long-term perspective. However, from the shorter-term perspective, the changes in both indicators can show different behavior with (even with opposite signs), mainly in the years already mentioned above. In 2012, there is a sharp increase in EDP debt rising by 4.7 percentage points. Due to large accumulation of assets, net debt has increased only by 1.6 percentage points. On the contrary, in 2014 EDP debt has decreased by 2.4 percentage points. Nevertheless, indebtedness expressed in terms of net debt has increased by 0.6 percentage point. Different trends in 2014 just reflect the fact that deficit and change in debt has been financed by decrease in assets.

Although the indicator on net debt provides important information on solvency or sustainability of government financial situation (Hartwig, Rodríguez-Vives, Slavík, 2011), further practical and methodological obstacles inevitably occur. Selecting instrument is only the first step in the process of net debt quantification. Notably the case of shares should be carefully assessed. Some part of shares can be undoubtedly traded on the market. However, it could be misleading in many cases to count given share in net debt due to the fact, that the aggregate of shares contains shares in strategic enterprises or institutions providing public or quasi-public goods. Rather case-by-case approach considering tradability and attractiveness for potential buyer could be applied.

Pros and cons of net debt just mentioned are rather indicative. The aim of this brief discussion is purely to demonstrate that both economic indicators have their strengths and weaknesses and they should be taken rather as complementary instead of competitive indicators. It is worth to mention that further indicators can be potentially also used in the analysis, among other the net worth of government sector (Milessi-Ferretti, Moriyama, 2004, Easterly, 1999) defined as a difference between total value of assets and total value of liabilities, alternatively net financial worth quantified as a difference between financial assets and financial liabilities. However, the uncertainty

⁹ However, there is an exception in case of deposits on the liability side. When interest on deposit accrues, it is reinvested in the instrument, thus increasing the value of debt. The meaning of this approach is that EDP debt is valued at face value representing the amount of money which the debtor is obliged to repay at maturity. In case of deposits, if the owner can withdraw its deposits, the debtor is obliged to repay the amount of debt including the value of accrued interests.

¹⁰ However, serious problem with consolidation arises in the case of government repurchase of its own bonds.

Figure 3 EDP and net debt, the Czech Republic, 2004–2014, % of GDP

Source: www.czso.cz, own calculation

in the valuation of items counted in this very comprehensive indicator makes the international comparison highly complicated.

CONCLUSION

As has been shown in the previous paragraphs, the key issue for the understanding of the relation between deficit and debt is the aggregate of “stock-flow adjustments” which covers economic flows and other factors having impact on government debt. Especially accumulation or decreasing in assets has its importance in the discussion on the relation between both indicators. This has been demonstrated on the example of Czech government institutions, mainly for years 2012 and 2014. As has been shown, the amount of SFA in the Czech government accounts does not clearly signify a creative accounting as understood in Hagen and Wolff (1999). However, the importance of SFA as an explanation of the development of both fiscal indicators in the Czech Republic has been rising in the last years. It has also been stressed that in the fiscal analysis the indicator on EDP debt should be supplemented by the indicator of net debt where value of liquid assets is subtracted from EDP debt. Analyzing of both EDP and net debt is preferable also due to the fact that they can show different trends over the years as has been demonstrated in the case of the Czech Republic.

References

- BLEJER, M., CHEASTY, A. The measurement of Fiscal Deficits: Analytical and Methodological Issues. *Journal of Economic Literature*, 1991, Vol. 29, No. 4.
- DIPPELSMAN, R., DZIOBEK, C., GUTIÉRREZ MANGAS, C. A. *What Lies Beneath: The Statistical Definition of Public Sector Debt*. IMF Staff Discussion Note, IMF, 2012.
- EASTERLY, W. *When is fiscal adjustment an illusion?* World Bank, 1999.
- EUROSTAT. *Manual on Government Deficit and Debt*. Implementation of ESA2010, Luxembourg, 2014.
- EUROSTAT. Measuring net debt: theory and practice [online]. Available at: <<http://ec.europa.eu/eurostat/documents/1015035/2041365/Measuring-net-government-debt-theory-and-practice.pdf/0c4f104d-856c-4818-adbf-cf-c7ea07ad9c>>.

- HARTWIG LOJSCH, D., RODRÍGUEZ-VIVES, M., SLAVÍK, M. *The Size and Composition of Government Debt in the Euro Area*. European Central Bank, Occasional Paper Series, No. 132, 2011.
- HAGEN, J., WOLFE, G. *What do deficits tell us about debt? Empirical evidence on creative accounting with fiscal rules in the EU*. Deutsche Bundesbank, Discussion Paper, No. 38, 2004.
- MILESI-FERRETTI, G., MORIYAMA, K. Fiscal Adjustment in EU Countries: A Balance Sheet Approach. *International Monetary Fund Working Paper*, No. 143, 2004.
- OFFICIAL JOURNAL OF THE EUROPEAN UNION. *Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union*. 2013, 174/1.
- VEBROVA, L., RYBACEK, V. How to Read Government Deficit and Debt. *Statistika: Statistics and Economic Journal*, 2014, No. 3, pp. 32–46.

Occupational and Sectoral Mobility in the Czech Republic and its Changes during the Economic Recession¹

Tereza Vavřinová² | National Training Fund, Prague, Czech Republic

Anna Krčková³ | National Training Fund, Prague, Czech Republic

Abstract

This paper reveals the scope and patterns of mobility on the labour market in the Czech Republic in between 2002 and 2013. Occupational and sectoral mobility are analysed using the data from the Labour Force Survey. The LFS data were adjusted into a form of longitudinal data enabling to follow an individual in four consecutive quarters. The frequency of mobility on the Czech labour market and its development during different phases of business cycle is studied. The level of mobility is examined in the entire population of the employed as well as among subgroups defined predominantly by socioeconomic characteristics. Patterns of labour mobility revealed by this paper are discussed in the light of similarly focused studies from abroad and theoretical approaches toward labour mobility.

Keywords

Labour market, labour mobility, occupational mobility, sectoral mobility, economic recession, human capital

JEL code

J62, J60

INTRODUCTION

As a result of social changes affecting also the labour market, the prospects of lifetime employment cease to be a common scenario nowadays. People, in the course of their professional careers, work in several jobs. Labour mobility is an important process allowing the economy as a whole to respond to structural and cyclical shifts, which are reflected, inter alia, in the disappearance of some jobs and the occurrence of new ones. In addition, labour mobility helps to level out differences among individual regions of the country.

¹ The study was supported by the Grant No. P402/12/G130 *Relations between the Skills, Education and Outcomes on the Labour Market: Longitudinal Study* provided by the Grant Agency of the Czech Republic.

² National Training Fund, Opletalova 25, 110 00 Prague 1, Czech Republic. E-mail: vavrinova@nvf.cz.

³ National Training Fund, Opletalova 25, 110 00 Prague 1, Czech Republic. E-mail: krckova@nvf.cz.

The objective of this study is to investigate the extent of labour mobility within the Czech labour market. Our research enquiry reads as follows – What is the proportion of workers who, in the course of one year, change from a job and economic sector? For the purpose of this study, we have developed a unique approach of work with the Labour Force Survey data which has been transformed into the panel data. We monitor the overall extent of labour mobility and its rates in individual subgroups of the population. The development of labour mobility is analysed in the scope of 11 years during the period of 2002–2013, which allows us to follow the shifts in labour mobility during different phases of the economic cycle. A substantial part of the analysis is, therefore, devoted to the evolvement of mobility patterns in the course of the pre-crisis as well as recession periods.

1 REVIEW OF THE LITERATURE

Labour mobility can be generally defined as one of the indicators of labour market flexibility. It is a mechanism contributing to a more efficient allocation of workers to jobs (Borjas, 2008). Labour mobility can be viewed from two different perspectives – geographic and structural. From the geographic viewpoint, it is related to situations when individuals change the region of their workplace, they commute to work or they change their residence because of the job. Structural mobility reflects transitions of individuals between jobs determined by different activities, different economic sectors or different positions within an organisation.

The neoclassical theory places labour mobility particularly in the context of levelling the disparities between unequally developed regions, which allows the economy to achieve the state of balance. However, it is not only about the geographic labour mobility, in terms of economic balance and dealing with structural shifts, also occupational and sectoral mobility play an important role. The level of flexibility with which the workers change their occupation or sector of employment determines, to a great extent, the ability of the economy to respond promptly to the growth and decline in demand for production in particular sectors. Thus, structural mobility can serve as part of the solution to the problem of structural unemployment.

Since the 60s, the scientific literature has been incorporating also the human capital perspective when approaching labour mobility. Many academic debates arise particularly from the question to which extent is the human capital related to a specific job and to which extent is it transferable. The beginning of these debates is marked by Becker's (1964) distinction between general human capital – beneficial to all potential employers – and specific human capital applicable at one employer only. Provided the transferability of human capital is limited and its structure is characteristic for particular jobs; any labour mobility leads to losses in human capital and therefore failed investment in the form of the time spent in a job. According to Becker, specific human capital explains why the workers' wages grow in relation to the length of their employment in the same job. The opinions of Neal (1995) and Parent (2000) represented an important contribution to this debate; they both concluded that the structure of human capital is subject to individual sectors of the economy. Kambourov and Manovskii (2004) responded to this debate with an article stating that skills applicable on the labour market are transferable within the performance of an occupation; therefore human capital is rather occupation-specific. Occupational and sectoral labour mobility are, within this concept, associated with certain losses in human capital, wages and ultimately also prosperity.

The study of mobility on the labour market has a long tradition particularly in the area of geographic mobility of workers. The debate concerning the nature of human capital fostered also the interest of experts in the research of occupational mobility. The importance of research of geographic mobility in the Czech context increased during the 90s of the 20th century as one of the aspects of the economic transformation research (e.g. Sorm, Terrel, 2000; Fidrncuk, 2004; Erbenová, 1997). During the last decade, however, the experts' interest in this matter has, with a few exceptions (such as Horváth, 2007),

considerably weakened. Labour mobility between economic sectors and occupational mobility on the Czech labour market and their patterns represent area that has been explored to a rather limited extent. It can be assumed that the main cause of such a situation lies in the complexity of labour mobility study in terms of appropriate data. On a theoretical level, transferability of skills between occupations and economic sectors is currently being explored by the European Commission (see e.g. European Commission, 2011).

2 METHODOLOGY AND DATA

This study uses the Labour Force Survey (LFS) conducted by the Czech Statistical Office⁴ (CSO) as the main data source. It is a household survey focused on determining the economic status of the population. The survey is conducted quarterly and the sample includes about 25 thousand households, i.e. approximately 50 thousand individuals more than 15 years old. An important feature of these surveys is their panel character. Individual households participate in the surveys in five consecutive quarters of a year, which allows following an individual or a household in the course of one year. Despite the immense analytical potential of this approach, the Labour Force Surveys are only exceptionally analysed as a panel and most studies use the data in order to calculate the cross-sectional indicators.

In order to take advantage of panel character of LFS data we developed the original method of data transformation. Micro-data provided by the Czech Statistical Office for individual quarters were broken chronologically according to the date of the visit to a household and subsequently, by means of identification of unique combination of variables, joined again in order to reflect the situation of individuals in households throughout their entire participation in the panel. Data adjusted in this manner allow for monitoring the evolution of the individual's position in the labour market. The uniqueness of work with the LFS data is one of the major contributions of this study.

This article analyses data concerning the individuals who joined the survey sample between 2002 and 2012 (therefore it covers the period of 2002–2013). Data are weighted by annual weight and are representative of the population of the country. The survey sample was further modified to suit the needs of mobility analysis between different labour market statuses. That required excluding the respondents who participated in the survey for the first time between 2002 and 2012 but failed to provide data for all five quarters and dropped out from the panel prematurely. In the mobility analyses, we work solely with those respondents who were, at the time of their first and fifth participation in the panel, employed,⁵ however, this does not exclude the possibility of their unemployment or economic passivity sometime between these two periods of time. The total unweighted survey sample was 187 494 respondents in case of analysis of occupational mobility and 204 559 respondents in case of sectoral mobility. The average survey sample for each year was around 17 thousands of respondents.

Respondents participate in the survey during five consecutive quarters and are included in the panel at different times of the year. Due to that, it is very complicated to assign with precision which respondents belong to a particular calendar year. Therefore, individual respondents are assigned to the year in which they participated in the survey for the first time. This procedure creates a certain time shift in the analysis findings of this paper, however, it allows for determining the time trends within mobility development. While interpreting the findings arising from the data, we need to bear in mind that phenomena assigned to the year t , were not taking place solely in the course of that year but also in the course of the year $t+1$. This information becomes crucial particularly when determining the impact of recession, which commenced to be evident on the Czech labour market in the fourth quarter

⁴ Methodological descriptions of the indicators are available at: <http://www.czso.cz/csu/redakce.nsf/i/zam_vsps>.

⁵ We work with a definition of employment formulated by the International Labour Organisation (ILO).

of 2008 and fully developed during 2009. The impact of the recession in 2009 is therefore best observed in respondents who started to participate in the survey in 2008.

Calculation of labour mobility indicators requires several methodological decisions that impact its final measured values. Conceptualisation of mobility was determined, as in most other studies, particularly by the availability of data. The first decision to be made was choosing the length of the analysed period. It is obvious, that the longer the period between the start and the end time of the measurement, the greater probability of mobility occurrence. We need to be aware of this fact particularly when comparing various studies. The length of the monitored period may affect the measured rate of mobility also in other ways. With the length of the monitored period increases also the risk of undetected cases of mobility. For the purposes of this paper, we opted to measure labour mobility in the time scope of 1 year.

Another decision in terms of methodology is the level of detail based on which the occupational/sectoral shifts in the respondent's employment will be assessed as mobility. The level of detail is reflected in the classification of an occupation/sector with which we work. It is definitely true that the more detailed classification, the higher mobility rate. For the purposes of this paper, occupational mobility is defined as the change of the four-digit ISCO code of the respondent's occupation during their participation in the panel. Four-digit ISCO classification is the most detailed breakdown offered by the Labour Force Survey data. At the same time, it allows for finding sufficient qualitative differences in terms of occupation contents between two adjacent four-digit codes. In the case of sectoral mobility, we decided to work with the two-digit NACE code due to very subtle difference between two adjacent sectors defined by the four-digit code. These sectors are very close to each other and we can assume that the transition between them does not cause any significant devaluation of sector-specific human capital.

The authors of studies on mobility need to deal with the problem of the so-called pseudo-mobility, which arises when individual occupations or sectors are in different situations classified with a different code. This objection is of high relevance due to the fact that the coding is, to a large degree, subjective. Within the LFS data, the pseudo-mobility problem is minimized as the Czech Statistical Office uses the so-called dependent coding for the purposes of data collection – the interviewer knows the respondent's occupation code used in previous interviewing. In this situation, the interviewer first checks whether the respondent's occupation has changed compared to the last visit. Provided the respondent does not report any change of job, the interviewer uses for the classification of their occupation the same code as the last time.

More substantial problem associated with analysis of occupational mobility arises from the change of classification that took place in 2011; the CSO began to use ISCO 08 instead of former ISCO. Due to this change, the occupations of the respondents entering the panel in 2010 were, during the first visit, coded according to a different classification than during the last visit. There is no possibility to “translate” clearly the codes of the former classification into the new one. Therefore, the respondents who had entered the survey in 2010, needed to be excluded from the analysis of occupational mobility totally.

In the course of monitored decade, there was also a change in the classification of economic sectors used in the Labour Force Survey. This change occurred in 2008, when instead of the previously used NACE coding, an updated NACE classification began to be used. However, during the year of the change as well as in the course of the following year, the respondents' occupations were coded with two codes – using both classifications at a time. Therefore, in the case of sectoral mobility, no year needs to be omitted from the analysis.

As indicator of occupational mobility, we use the *occupational mobility rate*, which is, for the purposes of this paper, defined as the proportion of employed individuals reporting during their first participation a different occupation classified with the four-digit ISCO code than during their last one, in the total number of respondents participating in the survey who were employed during both the first and the last participation period. The *sectoral mobility rate* is defined as the proportion of employed

individuals reporting during their first participation a different sector of employment classified with the two-digit NACE code than during their last participation in the total number of respondents participating in the survey who were employed during both the first and the last participation period.

3 ANALYSIS OF LABOUR MARKET MOBILITY

3.1 Occupational mobility

In the Czech Republic, the occupational mobility rate recorded the average value of 4.1% in 2002–2013. During 2002–2005, it was showing a gradual decline and until 2007, the rate of occupational mobility fluctuated around 3.5%. A breakthrough was recorded in 2008, when the occupational mobility rate increased sharply by 2.4 percentage points and in values around 5.4% oscillated also in 2009. After 2010, the year for which we cannot use the LFS data to measure the occupational mobility rate, it recorded a new decline towards the values around 3.5%, which were typical prior to 2008.

Where does this value stand in international comparison? To compare occupational mobility between countries is rather problematic. Authors of similar studies work with various concepts of occupational mobility; they use different data sources, measure the mobility within different time intervals and work with unequally defined subgroups of population.

Among the studies that, in terms of methodology, can be considered relatively close to our paper belong the works by Dex, Lindley and Ward (2007), Elliott and Lindley (2006) and Lalé (2012). They all work with the standardized data from the Labour Force Survey (LFS). The study by Dex, Lindley and Ward (2007) conducted in the United Kingdom determined the occupational mobility rate in 2000 at the value of 9.8%. The changes in occupation were monitored at the level of the main ISCO class (i.e. one-digit code), which means that they related solely to major career changes. And yet, the occupational mobility rate recorded in the UK was more than twice as high as the one measured in the Czech Republic while applying the changes in the ISCO coding at four-digit level. Another British study, conducted by Elliott and Lindley (2006), makes use of questions detecting the respondents' position one year after their first participation in the panel. By means of this method, the value of the occupational mobility rate between 1985 and 2000 was established between 4% and 8% per year. The measured rate of occupational mobility was, thus, between equal to twice as high as the rate determined by us. However, these authors also worked with significantly higher level of aggregation (43 occupational categories) than us in this study (ISCO – 435 categories, NACE – 408 occupational categories). Lalé (2012) determined, in his study, the occupational mobility in France at the level of the four-digit ISCO at the value of 7.4%. The results clearly suggest that the Czech workers change their occupation less frequently than the workers in the United Kingdom or France.

In comparison with other countries, the occupational mobility in the CR can be viewed as very low. This conclusion is confirmed also by the study *Naše společnost 2003 (Our Society 2003)* conducted by the Public Opinion Research Centre (Centrum pro výzkum veřejného mínění, CVVM). Findings of this study show that 45% of the respondents performed only one occupation in the course of their professional life another quarter of them did not change their profession more than twice in their lifetime.

What factors determine the occupational mobility rate in individual countries and what might be the causes of such a low occupational mobility in the Czech Republic? The frequency with which the workers switch jobs and thus the occupation can be determined, in the first place, by the form of labour legislation, particularly the protection of employees. Provided the Labour Code takes rather the side of employees and places more emphasis on the security of employment than on the flexibility of the workforce, the economy tends to show lower staff turnover and lower mobility. Based on the indicator of employment protection against individual or collective dismissal constructed by the OECD (2013), the level of protection of employees in the Czech Republic is significantly higher than the OECD average. The indicator records the lowest values in the Anglo-Saxon countries that show, at the same

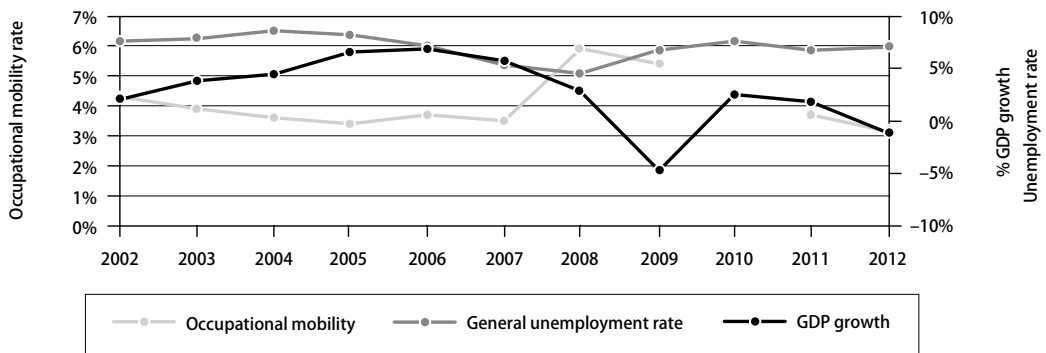
time, the highest rates of labour mobility. The French employment protection is stricter than the Czech one; however, France still records higher values of occupational mobility. Therefore, the form of labour legislation does not fully explain variability in occupational mobility across the countries.

Workers' employment values represent an important factor influencing occupational mobility in a given country. The *European Values Study 2008*, focused on examining employment values, shows that the workers in the CR greatly prefer the job security to the values associated with building a career. Conversely, workers in the old EU member states place emphasis on such values as possibility of career development or responsibilities within the job. Placing priority on job security results in decreased readiness to leave a job and embrace the risk related to potential unemployment or start in a new job.

Low rate of occupational mobility can be also related to the legislative regulation of professions, which represents significantly high costs for those interested in performing particular professions. The Czech Republic records the highest number of regulated professions (approximately 390) of all OECD member states (OECD, 2014).

Development of the proportion of workers who, in individual years, changed the occupation is illustrated in Figure 1. During 2002–2005, the occupational mobility rate was showing a gradual decline with a steady progression until 2007, it fluctuated in the region of 3.5%. The breakthrough was recorded in 2008, when the rate of occupational mobility sharply increased by 2.4 percentage points and in values around 5.5% oscillated also in 2009. After 2010, the year for which we cannot use the LFS data to measure the occupational mobility rate⁶, it recorded a new decline towards the values around 3.5%, which were typical prior to 2008.

Figure 1 Occupational mobility in relation to GDP and unemployment rate



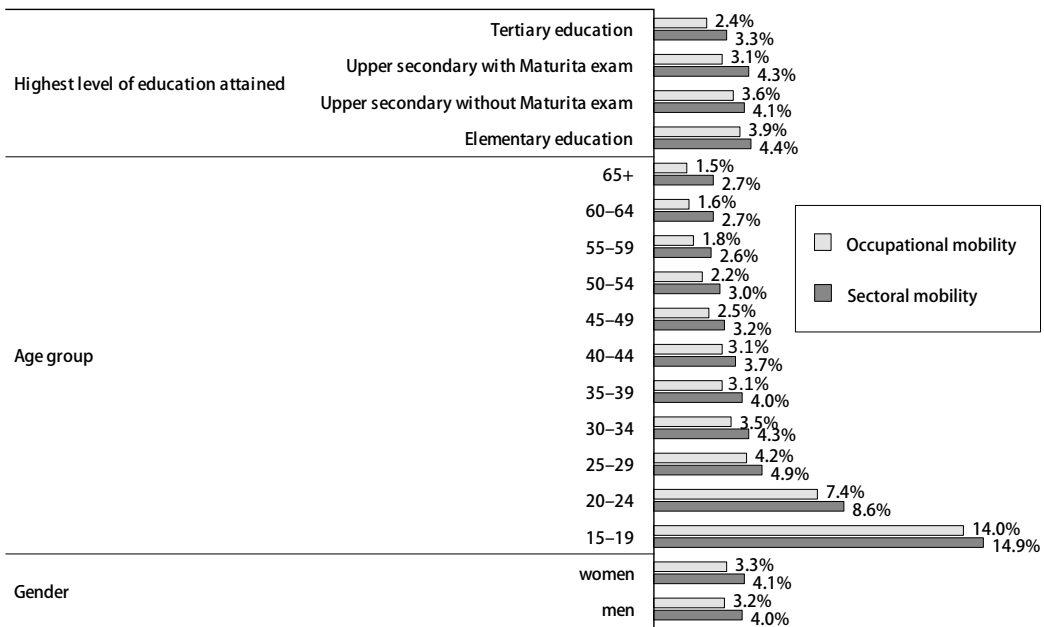
Source: Eurostat, Labour Force Survey (LFS), own calculations

Figure 1 illustrates also development of real GDP and general unemployment rate in the Czech Republic allowing us to see evolvement of these variables in relation with the occupational mobility rate. A significant increase in occupational mobility among respondents participating in the survey in 2008 coincides with the onset of economic recession in late 2008 and early 2009 associated with the growth of unemployment. From this perspective, we can conclude that the rate of occupational mobility was evolving in a rather countercyclical manner, however, without any substantial decline during the period of strong economic growth in 2005–2007. Given these developments, occupational mobility

⁶ See Chapter 2.

appears to respond rather to unexpected and significant drops in country’s economic performance than to longer-term growth. Increase in occupational mobility during the period of economic downturn remains, within the context of other studies, a rather unique phenomenon. Available analyses more often point out the fact that occupational mobility evolves in a pro-cyclical manner, i.e. it shows decline during recession (Kambourov, Manovskii (2004), Dex, Lindley, Ward (2007), Lalé (2012), Moscarini, Thomson (2007), Moscarini, Vella (2003)). A similar increase in occupational mobility during recession seen in the Czech Republic has not been detected even in the Slovak Republic (Říhová, Vavřinová, 2013); therefore, this phenomenon cannot be regarded as specific to the post-communist countries of Central Europe. Counter-cyclical evolvement of occupational mobility in the CR could indicate that people here seldom decide to change the occupation unless under negative external pressure. Under favourable economic circumstances, the vast majority of workers prefer inertia, which on one hand minimizes losses in human capital accumulated through workers’ experience while performing the occupation. On the other hand, this conservative attitude can represent an obstacle when circumstances require ability to adapt to changes related to modifying labour markets; these changes are often reflected in rapid creation of new occupations and disappearance of the old ones.

Figure 2 Occupational and sectoral mobility by age and education groups



Source: Labour Force Survey (LFS), own calculations

In general, there is no significant difference between men and women in terms of frequency of occupation changing. The same rate of occupational mobility in men and women is a feature by which the Czech Republic differs from other countries and which, at the same time, represents an interesting subject for further study. E.g. Parrado et al. (2005), Saben (1967), Moscarini and Vella (2003) as well as Lalé (2012) proved that in the USA and France, respectively, the rate of occupational mobility was higher in men across all age as well as education groups. Higher frequency of job changes in men was detected also in Slovakia (Říhová, Vavřinová, 2013).

The results indicate that the age is more important determinant in terms of occupational mobility. In the course of one year, almost 15% of workers within the age group 15–19 changed their occupation. However, within the age group 50+, this proportion did not exceed 3%. A significant milestone appears to be the age of 25 when the rate of occupational mobility stabilizes at values not too distant from the average. There are no major differences across age groups in terms of response of occupational mobility to economic cycle; the onset of economic crisis was followed by more frequent changes of occupation in all age groups.

Younger age is, also in other studies, considered one of the strongest predictors not only of change of occupation but also of any change in employment. This has been documented e.g. in the studies by Kambourov and Manovskii (2004), Lalé (2012), Parrado et al. (2005). The fact that younger workers change their profession more frequently is fully consistent with what the theory of human capital predicts in terms of occupational mobility. Provided that human capital is occupation-specific, a change of occupation results in its loss accompanied by the drop in wages. The longer period of accumulation of human capital, the more significant subsequent loss is.

When comparing occupational mobility among educational groups, higher education institutions' graduates stand out – on average, they changed occupation only in 3.3% of cases per year. Conversely, the highest rate of occupational mobility (4.4%) was recorded in workers with primary education as the highest level of education attained. The change of occupation was, therefore, during the monitored period, more frequent in less educated workers. The revelation of indirectly proportional relationship between the level of education attained and occupational mobility is consistent with the hypothesis that attributes rather involuntary nature to occupational mobility in the Czech Republic. Workers with tertiary education enjoy more favourable position on the labour market and, therefore, they are less often confronted with negative phenomena that besides unemployment, based on the results of this work, might include in the Czech Republic also the change of occupation. The theory of occupation-specific human capital predicts ambiguous conclusions in terms of the relationship between the level of education and occupational mobility. On one hand, the workers with higher level of education perform highly specialised occupations requiring longer period of training and change of occupation would lead to significant depreciation of human capital. On the other hand, the workers with higher level of education are expected to have, in addition to industry-specific skills and knowledge, also better general and transferable skills that enhance their flexibility and applicability on the labour market. Other studies on occupational mobility mostly agree with the conclusion of this paper, i.e. lower occupational mobility in workers with higher level of education (Kambourov, Manovskii (2004), partially also Parrado et al. (2005)), differences in mobility of variously educated workers are rather small and in some cases no differences were identified (Lalé, 2012).

The change of occupation was most frequent in unskilled manual workers, managers, executives and clerks. Workers in these occupations make use of skills that are relatively easily transferable between jobs and are less affected by the loss of human capital arising from mobility than workers using highly specialised skills, e.g. technicians, pedagogues and medical staff who showed, in the monitored period, the lowest rate of occupational mobility.

When focusing on the most common directions of occupational mobility we see that the vast majority of mobile workers change profession within the main occupation classes and thus select a new occupation that is as skill-intensive as the previous one. The most frequent were changes of occupation within the technicians and associate professionals (7.4% of total mobility). Transitions of science and engineering professionals into technicians and associate professionals occupations (4.8% of total mobility) and bi-directional transitions between craft occupations and machinery operator jobs (3.6 % and 3 % of total mobility respectively) were the busiest directions of mobility that included the change of main occupation class.

3.1.1 Directions of occupational mobility in the pre-crisis and crisis period

A glance at the structure and directions of occupational mobility reveals interesting differences between the pre-crisis (respondents entering the survey during 2006 and 2007) and the crisis period (respondents entering the survey during 2008 and 2009). During 2006–2007, craftsmen and skilled workers in manufacturing and machinery operators made for the largest proportion of mobile workers. These occupation groups provided for 18.8% and 15.8% respectively of all workers who changed their job in the given period. When comparing occupational mobility structure with the structure of employment (see Table 1), we see that the share of workers classified ISCO 7 and ISCO 8 on overall occupational mobility was relatively in proportion to their representation in the population. Conversely, from this perspective, the workers classified ISCO 3 are the most underrepresented.

In the period affected by the crisis, i.e. 2008–2009, the largest proportion of all mobile workers was recorded in science and engineering professionals (18%), engineering, medical and teaching staff (17%) and managers and executives (15%). The main difference between the period of relative economic expansion in 2006–2007 and the economic crisis consists in the fact that whereas, in the pre-crisis period, those changing jobs were particularly the workers in less skilled occupations, during the economic crisis, occupational mobility significantly increased in workers in skill-intensive occupations. The ISCO 2 workers were changing jobs more frequently than what would correspond to their representation within the employed population.

Pre-crisis and crisis periods differed also in terms of dominant directions of occupational mobility. In the pre-crisis period, the most frequent were the mobility flows consisting in the change

Table 1 Structure of employment and occupational mobility during pre-crisis and crisis period

| ISCO | Employment Structure | | Occupational Mobility Structure (initial occupations) | |
|--|----------------------|-----------|--|-----------|
| | 2006–2007 | 2008–2009 | 2006–2007 | 2008–2009 |
| 0 Armed forces | 0.3% | 0.3% | 0.1% | 0.3% |
| 1 Legislators, senior officers and managers | 6.6% | 6.3% | 6.6% | 15.0% |
| 2 Professionals | 10.9% | 11.5% | 7.0% | 18.1% |
| 3 Technicians and associate professionals | 22.1% | 23.3% | 15.0% | 16.6% |
| 4 Clerks | 7.0% | 7.2% | 8.9% | 6.5% |
| 5 Service workers and shop and market sales workers | 11.9% | 11.7% | 14.4% | 11.4% |
| 6 Skilled agricultural, forestry and related workers | 1.5% | 1.3% | 1.5% | 1.0% |
| 7 Crafts and related trades workers | 18.4% | 18.2% | 18.5% | 12.1% |
| 8 Plant and machine operators and assemblers | 14.1% | 13.4% | 15.8% | 11.1% |
| 9 Elementary occupations | 7.1% | 6.8% | 12.1% | 7.9% |

Source: Labour Force Survey (LFS), own calculations

of one-digit ISCO coding – transitions of craftsmen to occupations involving machinery operation (4% of total mobility), followed by the transitions of the services sector workers to associate professionals' occupations (3% of total mobility) and the transitions from unskilled jobs to the machinery operation occupations (2% of total mobility). In the crisis period, transitions of science and engineering professionals to associate professionals' occupations, accounting for as much as 11% of total occupation changes, dominated among the mobility flows. Other mobility directions of major significance were represented by the transfers of workers in managerial and executive jobs to associate professionals' occupations (4% of total mobility) and professionals' transitions to office worker jobs (3.4% of total mobility).

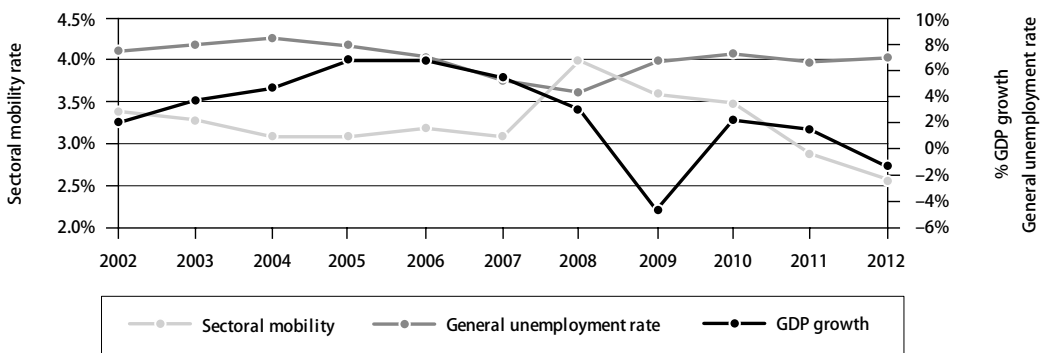
During the period of economic recession, occupational mobility, to a large extent, was related to workers in skill-intensive jobs. Given that the ISCO classification of occupations is derived from skill-intensity of occupations, where the Class 1 represents the highest intensity and the Class 9 the lowest one, we can say that, in the course of the economic crisis, the incidence of downward mobility (41.5%) was almost twice as frequent as the incidence of upward mobility (23%). During the pre-crisis boom, the ratio between the upward and downward mobility, defined in identical manner, represented 1:1.2.

3.2 Mobility among economic sectors

Growth in some economic sectors and downturn in others is a natural occurrence in market economies reflecting technological progress and social development. Changes in sectors' output are accompanied by shifts in employment. Every time more rapid changes in the labour market make the individuals respond to the structural economic shifts not only by selecting the field of study but also by changing the industry of employment in the course of their professional careers.

The sectoral mobility rate in 2002–2013 amounted to the average value of 3.2%. The development of mobility between economic sectors (Figure 3) illustrates identical countercyclical trend as occupational mobility, which might be down to partial blending of these phenomena. Only in less than one third of cases (29%), the workers who started to work in a different sector performed the same occupation as in their previous job. Changing occupation within the same sector was relatively more frequent practice and yet, considerable number of workers changing their occupations, changed also the sector of employment (56%). Therefore, the change of sector of employment and the change of occupation are very closely related and in a vast majority of cases they overlap. Due to that, the same patterns and relationships have been identified within them. Close relation between occupational and sectoral mobility is confirmed also by the British study conducted by Elliott and Lindley (2006). During 1985–2000

Figure 3 Development of sectoral mobility in the CR



Source: Eurostat, Labour Force Survey (LFS), own calculations

in the United Kingdom, the sectoral mobility was evolving in accordance with the occupational mobility; however, it was recording lower rates throughout the major part of that period.

In comparison with occupational mobility, the incidence of workers' transitions between sectors is lower. Concurrently, its evolution in time is more stable. Upon the onset of the economic recession, the workers' transitions between economic sectors became more frequent than in previous years, however, the increase was not particularly sharp and the sectoral mobility rate grew by less than 1% compared to the previous year. Due to a very limited number of available studies, it is difficult to compare the rate internationally, although, even the limited quantity of sources indicates that the rate recorded in the Czech Republic can be described as very low. In the United States, Kambourov and Manovskii (2004) measured the rate of sectoral mobility at 10% even when working with significantly higher level of aggregation of economic sectors.⁷ The study by Osberg, Gordon and Lino (1994) states, that in 1987, 19% of workers changed their sector of employment classified by two-digit code. The already mentioned Elliott and Lindley (2006) established, for the period of 1985–2000 in the United Kingdom, the rate of mobility among 10 economic sectors at the values between 4% and 6.8% per year.

Again, the countercyclical evolution of sectoral mobility in the CR is not in concordance with the results of foreign studies that usually attribute the pro-cyclical nature to it (Greenway, Upward, Wright (1999), Meriküll (2011)). The relation between sectoral mobility and the evolution of GDP once again indicates that, in the Czech Republic, the change of occupation tends to be involuntary and forced by circumstances.

In 2002–2013, 3.2% of men and 3.3% of women on average changed the sector of employment (see Figure 2). Prior to 2006, transitions between economic sectors were more frequent in men; in 2006–2009, the rates of sectoral mobility in men and women were almost identical, while after 2009, it were women who showed higher incidence of changing the sector of employment. Within the area of structural mobility of workers, the Czech Republic, in comparison with other countries, records solely subtle differences between men and women. The foreign studies tend to establish higher rates not only of occupational but also of sectoral mobility for men (e.g. Bachmann, Burda (2010), Parrado et al. (2005)).

The sectoral mobility rate varied from 1.5% up to 14% for individual age groups. Similarly as in the case of occupational mobility across all the sectors, it was the youngest workers who were changing their occupation most often. The proportion of persons moving, in the course of a year, from one economic sector to another, was declining linearly with the age. Detailed results are indicated in the Figure 2. Similar relation between the age and the incidence of mobility between sectors can be found in all the studies available (e.g. Greenway, Upward, Wright (1999), Bachmann, Burda (2010)). Based on the findings of our study as well as the results of the research conducted abroad, it appears that the age is the strongest and universally applicable predictor of any kind of labour market mobility.

Similarly as the occupation changes, also the changes of economic sector were mostly related to the less-skilled workers. Again, the relationship is linear; therefore it holds that the higher level of education, the lower the probability that an individual would change the sector of employment in the course of the year. The sectoral mobility rate varied from 3.9% for those with primary education down to 2.4% for the graduates from the tertiary professional schools and the higher education institutions.

More frequent transitions between sectors are to be expected in occupations that are not industry-specific (industry-specific occupations – e.g. teachers or miners) but which are easily applicable in various sectors of the economy (e.g. cleaning staff, clerks, accountants, IT specialists). In the Czech Republic, the lowest rate of changes in sector of employment was recorded in workers with tertiary education who mostly perform highly specialised occupations not easily transferable between sectors. However, there are exceptions to this conclusion illustrated by the example of accountants or IT specialists as occupations that

⁷ Kambourov and Manovskii worked with 33 sectors, analyses in this paper are based on 88 sectors.

are easily applicable in almost all sectors of the economy. When looking at the rate of sectoral mobility in specific occupation groups in the Czech Republic, we can see that transitions between economic sectors were most frequent in manual workers (on average 4% per year), the least frequent they appeared to be in technicians and associate professionals (on average 2% per year). This suggests that it was precisely due to the fact that in the vast number of professionals' occupations, it is not possible to find employment in a different economic sector without a complete change of qualification.

Due to the reclassification of economic industries conducted in 2008, it is more complicated to analyse sectoral mobility directions. In order to minimize these difficulties, we first define the source and the target sectors at quite a substantial aggregation level. This procedure allows us to compare, with a high degree of reliability, the periods processed according different classifications; moreover, it helps us to overcome another potential problem of this analysis – low numbers of cases in some of the transition matrix cells. Therefore, we will work with the following descriptions of economic sectors:

Table 2 Descriptions of Economic Sectors

| Sector | Description | NACE rev.1 | NACE rev.2 |
|---|---|------------|------------------|
| Agriculture | Agriculture, forestry, fishing | A, B | A |
| Manufacturing | Manufacturing, mining and quarrying, electricity, water and gas production and supply | C, D, E | B, C, D, E |
| Construction | Construction | F | F |
| Trade and service activities | Wholesale and retail trade, accommodation and food service activities, transportation and storage | G, H, I | G, H, I |
| IT and other information services and culture | Financial activities, IT and communication services, research and development, other professional, scientific and technical activities, culture | J, K | J, K, L, R, M, N |
| Non-market sector | Public administration, education, healthcare | L, M, N | O, P, Q |

Source: Classification of economic activities, own construction

The sectors not listed above⁸ were due to the low numbers of cases and ambiguous description omitted from the analysis.

Analysis of sectoral mobility flows revealed that the most frequent transitions were recorded within the defined sectoral groups. The most significant share of sectoral mobility (19%) occurred within manufacturing; therefore, it was related to workers moving from one manufacturing industry to another. Other major flows of mobility were bidirectional transitions between the industry of manufacturing and the trade and service sector, while slightly more significant was the flow of workers from manufacturing to trade (8% of total mobility). In addition to the transitions of workers within the above described sectoral groups, other significant mobility flows included transitions of workers from the trade and service sector to the IT and other information services sector (3.3% of total mobility) and from the manufacturing sector to the construction (3.5%).

⁸ The sectors described as *Other service activities*, *Activities of households as employers* and *Activities of extraterritorial organizations and bodies* (categories P, Q and R in NACE rev.1 and S, T and U in NACE rev.2).

3.2.1 Sectoral mobility response to the economic recession

During the economic recession, the main difference in the sectoral mobility samples compared to the pre-crisis period was a significant outflow of workers from manufacturing industries. While the manufacturing represented the source industry for 40% of mobile workers, it absorbed solely 32% of the total mobility. The workers leaving the manufacturing industries, most often, found their new employment in the trade and service sector, but also in the construction or non-market sectors. The proportion of mobility from the manufacturing industries towards the construction in the total sectoral mobility increased in particular during the economic recession. Nevertheless, the major proportion of mobility occurred again within the manufacturing industries (21% of total sectoral mobility). Another important difference compared to the pre-crisis period was the increased frequency of mobility towards the non-market sector. Particularly within the non-market sector, the number of workers who found their new job there and met the definition of mobility exceeded the number of those who left by most. In contrast to 2006–2007, the workers employed originally in the manufacturing industries and the IT and other information service sectors were increasingly moving to the non-market sector.

Upon the onset of the economic recession in 2008, mobility between economic sectors proved to be, to some extent, a mechanism levelling out the structural shifts in the economy. The mining and quarrying together with manufacturing industries were the most affected by the recession, according to the CSO data, in 2007–2009, their production decreased by 15% and 13% respectively. Following the onset of the economic crisis, manufacturing industries recorded higher number of workers leaving than arriving. Conversely, increased numbers of workers were absorbed by the industries described as predominantly non-market sector (public administration, education and healthcare). These industries experienced only limited impact of the economic recession and their production increased by 3% in 2007–2009.

CONCLUSION

The aim of this study was to report on the mobility of the Czech labour market in 2002–2013. It provides information on the incidence of structural mobility and its patterns and regularities predominantly on microeconomic level. For the purposes of mobility measuring, we have created an original methodology suitable for working with the Labour Force Survey data processed into panel data.

Significant methodological contribution of this study is in the unique approach to Labour Force Survey data itself. From the research perspective the transformation of LFS data into panel data provides highly valuable information and offers immense potential for further analysis and therefore it is rather surprising that similar approach remains, in the Czech Republic, rather an exception.

Findings of the study show that every year during 2002–2013, on average 4.1% of workers changed their occupation, the change in industry of employment was relatively less frequent and concerned, on average, 3.2% of workers per year. International comparison revealed that the labour market mobility in the Czech Republic is very low. Our study identifies several causes of this situation. The first one is the legislative anchoring of employment relationship in the Czech Labour Code that, within all the OECD countries, belongs to those placing most emphasis on protecting workers from dismissal. Secondly, the low mobility might be also down to the employment values of the Czech workers, vast majority of whom, according to the European Values Study, appears to prefer security of employment to career advancement. The high number of regulated professions might be another explanation for the low labour market mobility.

While analysing mobility within individual subgroups of the population, we have found out that changes of occupation were more often related to the young and less-educated workers; and that the workers in low-skill manual occupations and clerks were more likely to change the sector of employment or the occupation than the rest.

The conflicting view of theoretical approaches makes it more difficult to assess whether the low level of labour market mobility represents a problem. The theory of human capital places the change

of occupation in relation to losses of investments in human capital, which is by various theoreticians considered to be job-, profession- or sector-specific. In such a perspective, the low level of mobility is desirable, since the economy thus records only small losses in human capital. Conversely, the neoclassical theory assumes that the low labour market mobility may represent an obstacle for an efficient allocation of productive resources and ultimately lead to higher unemployment and less flexible responses to economic cycles and technological changes.

This study demonstrated rather countercyclical development of occupational and sectoral mobility in the Czech Republic reflected by a particularly sharp increase in mobility incidence during the recession starting in 2008. Given that, we can conclude that transitions between occupations, on the Czech labour market, are predominantly involuntary. The hypothesis suggesting that the increase in mobility during the recession was mainly caused by involuntary job changes is confirmed by the analysis of mobility in individual subgroups of the population. In the period following 2008, there was a significant change in directions of occupational and sectoral mobility and the major part of it can be described as downward mobility. Change of occupation, during the period of crisis, became more frequent than before in workers performing skilled professions. That can be explained by the fact that the less qualified workers had, in the event of losing the job, difficulties to find a new employment and stayed unemployed for a longer period of time while the workers with higher qualifications had better chance to find a job, although, most likely less attractive than the previous one. All these contexts lead to the conclusion that if workers, in the Czech Republic, decide to change the job, it is very often due to external pressure rather than their efforts to build a career.

References

- BACHMANN, R., BURDA, M. C. Sectoral transformation, turbulence and labor market dynamics in Germany. *German Economic Review*, 2010, Vol. 11, No. 1, pp. 37–59.
- BECKER, G. S. *Human Capital*. Chicago: University of Chicago Press, 1964. 412 p. ISBN 978-0-226-04120-9.
- BORJAS, G. J. *Labour Economics*. Boston: McGraw-Hill, 2008. 544 p. ISBN 978-0-07-340282-6.
- CENTRUM PRO VÝZKUM VEŘEJNÉHO MÍNĚNÍ SÚ AV ČR. 2003. Naše společnost. *K profesní a pracovní mobilitě obyvatel* (Tisková zpráva) [online]. Prague: Sociologický ústav AV ČR, 2003. <http://cvvm.soc.cas.cz/media/com_form2content/documents/c1/a2980/f3/100249s_eu30725.pdf>.
- CZECH STATISTICAL OFFICE. *Labour Force Survey*. Micro-data 2002–2013. Prague.
- DEX, S., LINDLEY, J., WARD, K. *Vertical occupational mobility and its measurement*. Working Paper No. 2007006, The University of Sheffield: Department of Economics, 2007.
- ELLIOTT, R. J. R., LINDLEY, J. Skill Specificity and Labour Mobility: Occupational and Sectoral Dimensions. *The Manchester School*, 2006, Vol. 74, No. 3, pp. 389–413.
- EUROPEAN COMMISSION. *Transferability of skills across economic sectors: role and importance for employment at European level* [online]. Luxembourg: Publications Office of the European Union, 2011. ISBN 9789279209468. <<http://ec.europa.eu/social/BlobServlet?docId=7124&langId=en>>.
- ERBENOVÁ, M. Regional labour mobility, wages and unemployment in The Czech Republic. *Prague Economic Papers*, 1997(1).
- EVS. *European Values Study 2008: Integrated Dataset* (EVS 2008). GESIS Data Archive, Cologne, ZA4800 Data file Version 3.0.0, doi: 10.4232/1.11004, 2011.
- FIDRMUC, J. Migration and regional adjustment to asymmetric shocks in transition economies. *Journal of Comparative Economics*, 2004, 32(2), pp. 230–247.
- GREENAWAY, D., UPWARD, R., WRIGHT, P. *Sectoral mobility in UK labour markets*. Research Paper 99/1, University of Nottingham: School of Economics, Centre for Research on Globalisation and Labour Markets, 1999.
- HORVÁTH, R. Mezuregionální migrace obyvatelstva v České republice: Role likviditních omezení. *Ekonomický časopis*, 2007, 8, pp. 731–746.
- KAMBOUROV, G., MANOVSKII, I. *Rising occupational and industry mobility in the United States: 1968–1993*. Discussion Paper IZA DP No. 1110, Bonn: Institute for the Study of Labor, 2004.
- LALÉ, E. Trends in occupational mobility in France: 1982–2009. *Labour Economics*, 2012, Vol. 19, No. 3, pp. 373–387.
- MERIKÜLL, J. *Labour market mobility during a recession: the case of Estonia*. Working Paper 2011–01, Bank of Estonia Working Papers, 2011.

- MOSCARINI, G., VELLA, F. *Occupational mobility and employment reallocation: evidence from the NLSY79*. Yale University: Department of Economics, 2003.
- MOSCARINI, G., THOMSSON, K. Occupational and Job Mobility in the US. *Scandinavian Journal of Economics*, 2007, Vol. 109, No. 4, pp. 807–836.
- NEAL, D. Industry-specific human capital: Evidence from displaced workers. *Journal of Labor Economics*, 1995, Vol. 13, No. 4, pp. 653–677.
- OECD. *OECD Economic Surveys: Czech Republic 2014*. OECD Publishing, 2014. ISBN 978-92-61-20935-0.
- OECD. *Protecting jobs, enhancing flexibility: A new look at employment protection legislation* [online]. OECD Publishing: OECD Employment Outlook 2013, 2013. <http://dx.doi.org/10.1787/empl_outlook-2013-6-en>.
- OSBERG, L., GORDON, D., LIN, Z. Interregional migration and interindustry labour mobility in Canada: A simultaneous approach. *Canadian Journal of Economics*, 1994, Vol. 27, No. 1, pp. 58–80.
- PARENT, D. Industry-specific capital and the wage profile: Evidence from the national longitudinal survey of youth and the panel study of income dynamics. *Journal of Labor Economics*, 2000, Vol. 18, No. 2, pp. 306–323.
- PARRADO, E., CANER, A., WOLFF, E. N. *Occupational and industrial mobility in the United States 1969–93*. Working Paper 416, Levy Economics Institute, 2005.
- ŘÍHOVÁ, H., VAVŘINOVÁ, T. Occupational mobility in the ageing society – Changing occupation in the Czech and Slovak labour markets in 2003–2012. In: LICHNER, I., RADVANSKÝ, M. (eds.). *Impacts of Ageing on Public Finances and Labour Markets in EU Region*. Bratislava: The Institute of Economic Research of the Slovak Academy of Sciences, 2013, pp. 84–103. ISBN 978-80-7144-214-1.
- SABEN, S. Occupational mobility of employed workers. *Monthly labor review*, 1967, Vol. 90, No. 6, pp. 31–38.
- SORM, V., TERRELL, K. Sectoral restructuring and labor mobility: A comparative look at the Czech Republic. *Journal of Comparative Economics*, 2000, 28(3), pp. 431–455.

Seeing the Hidden Part of the Iceberg: Gauging the Real Dimension of International Migration

Adrian Oțoiu¹ | Bucharest Academy of Economic Studies, Bucharest, Romania

Emilia Țițan | Bucharest Academy of Economic Studies, Bucharest, Romania

Abstract

The reliability and comparability of international migration statistics belong to the most important statistical issues due to the importance of correct dimensioning of the migration flows and stocks for effective and timely design of effective policy measures. This paper presents an assessment of the migration statistics provided by Eurostat, reveals the most prominent discrepancies between stock and flow data, prepares a summary of vital issues affecting both quality and completeness of the migration data, and identifies certain solutions in order to improve data comparability, reliability and completeness. There is no one-size-fits-all solution, but an eclectic mix which extends the use of administrative and private data, matches data coming from distinct sources, harmonizes the way in which data is compiled and reported by different countries, matches observed flows with (demographic) stock-based estimates, provides consistent estimates of the bilateral migration flows between countries, and improves the measurement of temporary and illegal/undeclared migration.

Keywords

Official statistics methodology, international migration, migration measures, data harmonization, data dissemination

JEL code

F22, C81, C18, C46

INTRODUCTION

International migration is one of the most important social phenomena, which affects both the origin and destination countries, and gives birth to fairly large changes in their societal structure. An estimate by Vasileva (2011) shows that “6.5% of the EU population are foreigners and 9.4% are born abroad”, with about 2/3rds of foreigners born in a country outside the EU.

Besides the fact that it raises significant cultural changes triggered by the increase of the multicultural character of the destination countries, international migration has far-reaching economic implications. Immigration is acknowledged as a solution to population ageing, as most immigrants are of working

¹ Department of Statistics and Econometrics. Corresponding author, e-mail: otou.adrian@gmail.com.

age. Immigration is a solution to skills shortages in destination countries, caused by both massive retirements in certain industries, and by an increasing demand for health care and assistance services workers.

The other component of migration, emigration, casts more light on the importance of the phenomenon. Thus, while emigration can be detrimental to the originating jurisdiction, by aggravating shortages of professionals (e.g. health care professionals), it can also alleviate labour surpluses occurring in declining industries. For example, in developing countries, productivity advances in agriculture can lead to widespread unemployment that can be reduced by mass emigration.

Additionally, in multinational blocks such as the EU, migration, which usually refers to movements of people into and outside the Union, and movements within the EU defined as mobility, (Boswell and Geddes, 2010) can act as a means for a better redistribution of labor resources, and contribute to both an improved personal fulfillment of their citizens and to an increased competitiveness of the economy. Migration in this paper will also refer to cross-border mobility within the EU unless otherwise stated.

However, despite its importance and far-reaching economic and social implications, it is the consensus that international migration is not adequately measured in official statistics. This is due to many facts: the volatility of various forms of migration that is seasonal (and often undeclared), the methodology based on self-reporting of the migrants that can be either restrictive or not relevant in case of illegal migration, etc. This leads to significant misestimations of migrant flows, with direct results on the effectiveness of some policies that address successful integration of the migrants in the host societies, planning for the occupational deficits, adequate dimensioning of specific social services, etc.

Therefore, this paper attempts to explore the underestimation of migration flows, and seeks to identify the key directions to address it. The first deals with discrepancies between different migration data available from official statistics. Then the main reasons behind the differences are examined. The final part summarizes and suggests potential solutions for improving the quality of migration data.

1 WHERE ARE WE NOW? A CRITICAL LOOK AT THE DATA

The migration phenomenon cannot be properly measured in some countries. One of the examples is Romania, where the National Statistical Institute warns that administrative sources for external migration do not cover the entire phenomenon, especially the emigration flows from Romania. As such, there is a severe underestimate of the phenomenon which leads to an overstatement of the Romanian population (National Institute of Statistics Romania, 2014). A closer examination shows that, while the National Institute of Statistics' flows' data counts 129 000 officially declared net migrants between 1992 and 2002, census statistics show 697 thousand migrants after taking the natural decline of the population and the officially recorded net migration out of the total population decline (Ghețu, 2007).

The situation affects many European countries. While migration statistics revolve around migration flows and stocks of migrants within a country, there are often major discrepancies between the two, which cannot be satisfactorily explained by statistical adjustments or other related procedures.

A comparison between the (demographic-based) net migration plus statistical adjustment data reported in the Eurostat population tables, and the net international migration flows, computed as the difference between the immigration and emigration, shows that for the EU 27 during 2002–2012 period, the latter represents only 71% of the former. Further examination of the data for 29 European countries for which data covering more than five years were available, shown in Appendix 1, reveals that for 14 of them, stocks and flow measures differed by over 10%, even after removing the highest and the lowest annual discrepancies between the two migration measures. While for most of them flow data seems to cover only part of the migratory flows, in several cases (Italy, Hungary, Poland and Portugal), the stock measure appears to be much lower than the recorded flows, which raises a question of reliability of the flow measures.

The results obtained led to the question of how well statistics about the number of foreigners within a county match its statistics on immigration. To this end, the annual change in the stock of foreigners

based on the population statistics by country of birth was computed, and compared with immigration flows net of return migration, where available. Return migration consists of emigrants whose place of birth differs from the country of emigration, and immigrants born in the country of immigration.

Results from the Eurostat data from 2010 to 2012, show that the change in foreign-born population in the EU-27 is 2.5 times lower than annual immigration numbers. The annual change in the numbers of foreign-born reveals potential data issues since for Hungary and Slovenia, a decrease in foreign-born population is accompanied by an increase in immigration (see Appendix 2). The above, plus the fact that annual changes in the stocks of the foreign-born population are, as a rule, much lower than (net) immigration numbers, and that variations in the stocks of the foreign-born individuals are considerably larger than those observed in the immigration numbers, can point out to serious reliability problems.

Major discrepancies between countries can be found with respect to bilateral flows data. Thus, in the absence of any reported data quality issues and disclaimers, the EUROSTAT data on annual emigration flows from the UK to Spain sums up to 58 thousand for the 2009–2012 period, whereas immigration to Spain from the UK is 33% higher than that, amounting to 77 thousand.

2 THE NATURE OF DIFFERENCES

In order to improve understanding of differences, there is the need to inquire about their sources.

The main cause behind the lack of reliability of migration statistics is its coverage, which is incomplete due the methodology. Thus, a person is considered to be a permanent migrant if he/she changes its country of usual residence for a period of at least one year (EUROSTAT, 2013, following the UN definition). This is mainly based on the self-reporting of individuals, and excludes the number of persons that have not reported, or avoided reporting themselves as migrants due to the illegal nature of their move. The same applies to short-term migrants, which are considered as such if they change the place of usual residence for more than three months, but under a year.

The process of statistical data collection itself leads to fluctuations in the number of migrants within the country. Flows data may be subject to two-year delays as it is available only after a given calendar year has passed. To overcome this, some countries have chosen to report as migrants those who stayed for over three months (Beer et al., 2010). In other cases, immigration counts are based on the intended period of stay (Fassmann, 2009, cited by Beer et al., 2010).

Differences in country-specific methodologies also account for many differences in the data. While many countries impose a time limit for the intention to stay in another country except for temporary purposes (visiting relatives, medical treatments, etc.), some (e.g. Germany) consider the intention to migrate regardless of the duration of stay (Beer et al, 2010). In other cases (Lemaitre, 2005), countries which issue permanent residence permits tend to exclude non-holders from the statistics (e.g. international students enrolled in degree programmes in Canada and the US).

Transitions from temporary to permanent migration could also induce a bias in the migration flows data. While transitions can be straightforward for highly trained professionals that are legally employed (Lemaitre, 2005), the same cannot be said about short-term seasonal workers or undocumented migrants. In order to solve these issues and provide a clean break for the undocumented migrants, some countries have performed one-time regularizations for undocumented workers, e.g. Italy in 2002, and Spain in 2005 (Finotelli and Arango, 2011). A summary of findings by Finotelli and Arango (2011) report that, following regularization, immigration irregularity seems to have increased again.

Census under-coverage affects migration stock data, which originates from demographic data, which is, in turn, based on population census data. However, censuses are conducted based on administrative records, which can leave out migrants who were not recorded at the time of establishing the census sampling frame. Likewise, emigrants are likely to be included in the sample frame, even if they have left the country. These issues can be compounded at the time the data collection is carried out through

significant non-response rates. Clark (2009) shows that the permanent and temporary migrants have the lowest response rates for the 2006 Canadian census undercoverage survey.

In addition to undercoverage and non-response issues, stock-based methods can preserve the inertial character of demographic statistics, based on the past census estimates extrapolated to the future using fertility, mortality and migration assumptions. Where the first two components are fairly stable, the known volatility of the migration component (Hatton, 2010) may invalidate stock measures, even though they are useful in providing migration data that compensates for some undercoverage from the incomplete reporting of migration. The issues of temporal comparability, resulting from the impact that economic conditions have on migration, do affect the reliability of stock measures that are not able to factor in the observed volatility of migration flows (Bell et al., 2002).

Short-term movement of qualified workers is often not captured in the statistics. While EUROSTAT publishes data about movement of students, teachers, and Ph.D. holders, there is no regular data series that cover movements of some highly trained professionals such as medical doctors, IT specialists, etc. This data could significantly minimize the gaps between data reported by receiving and originating country, and would improve the measurement of labor migration (UNSTATS, 2004).

3 GETTING TO SEE MOST OF THE ICEBERG. SOLUTIONS TO IMPROVE INTERNATIONAL MIGRATION DATA

One way to improve the consistency and reliability of statistics is to increase international cooperation and harmonization (ILO, 1995). To this end, the example of UK and Spain is relevant; as both are developed countries, and migratory movements are established, it is not acceptable to see that 25% of the UK arrivals in Spain are not reported by the UK statistical office. If all bilateral flows were consistent, there could be significant gains in the reliability of the data.

Promoting an extended use of administrative sources can improve the reliability of the data. In addition to population records, tax and social security records can help assess de-facto movements to another jurisdiction, bar the illegal migrants who do not officially work, and some senior retirees that do not need to comply with the local requirements, as long as they do not exceed certain length-of-stay provisions. Other administrative sources, immigration data, border crossing data, travel records, establishment and labor force surveys, may provide data on foreign nationals who entered the country, and how long they stay.

The major caveat of this data is that it does not catch the entire migration phenomenon. Leaving aside compatibility of statistical sources, delays in data availability and processing, and lack of coverage for migrants, this data also may fail to cover internal movements within Schengen-like areas, for which administrative and border crossing controls are laxer.

Where public data may show its limitations, private data sources may be the key to complement the undercoverage of migratory movements. Transportation tickets issued by private companies may help document migrant routes that are less affluent and more prone to go illegal in the destination country (e.g. coach transportation records). (Travel) Insurance data may also tell about the international movements of policyholders. Credit bureau data, electronic payment data, and phone records may, too, provide information on the whereabouts of migrating individuals, and reveal their location relative to their social network. Remittance information can help identify anyone who regularly sends money to one's relatives working and living abroad, even if this person's property taxes are paid in his country of origin where remittance recipients live.

Private data usually contains information on the customers, such as national ID's passport numbers, date and place of birth, address, etc, which may help link it with administrative sources on one or more attributes.

Recruitment agencies can help record migration of skilled workers by providing additional information insights about their intended occupation, their level of education, the industry they will work in, along with age, gender and prospective salary (Hoffmann and Lawrence, 1994).

Application for residence, refugee, asylum and crime data are useful in recording undocumented migration. While other data discussed so far has a rather neutral stance with respect to the migrants by merely recording facts concerning particular persons, this data focuses on migration-specific intentions and foreign residence and stay issues. This type of data may be useful in covering at least partially the recent massive inflows of refugees from Africa and Middle East, coverage that should increase within the next months after migrants will come in contact with immigration and law enforcement authorities.

Finding ways to account for the transitions from temporary to permanent migration should be another priority for improving the quality of statistics, which partly addresses the issues of measuring irregular migration, avoiding overestimation of migration for countries that report migration over three months as permanent migration, avoiding double counting of migrants, and improve the estimates for both types of migration.

Incorporating information of census undercoverage and/or overcoverage data, and on response rates, into demographic projections, can improve estimates of the migrant stocks and bring them closer to reality. In this respect, other survey frames, especially those focusing on migrants, can be useful through comparisons with the census frames.

Apart from solutions that attempt to harmonize methodologies across countries, calculation methods are useful quantitative tools applied for improvement of migration data consistency and comparability.

Some of the most common methods are based on minimized sum of squares of the bilateral matching flows, similar to the one proposed by Beer et al., (2010).

Other methods propose to derive migration flows from migrant stock data (Abel, 2013). While this method has its benefits, we consider that its merits merely lie in matching stable but rather inertial demographic-based with the volatile and undercoverage-affected flows data, rather than in correctly estimating migration from stock estimates.

Another method proposed by Raymer et al. (2013) attempts to calculate migration data by factoring in country differences in migration reporting, estimates of the undercount of the flows, expert-based prior distributions, and variables showing impact on the levels of migration: population, gross national income per capita, migrant stocks, along with indicators of cultural affinity, labor market and immigration openness, contiguity, etc. This model is one of the first attempts to incorporate several types of information about the caveats of the migration data into a complex model.

DISCUSSION, CONCLUSIONS AND PERSPECTIVES

The lack of reliability and comparability affecting international statistics of migration is not new and has attracted significant efforts with the aim to improve them.

The analysis of the caveats of migration measures and the solutions proposed to improve them clearly shows that there is no unique strategy to yield a satisfactory solution of migration flows. Rather, a multi-pillar strategy that achieves a synergy between the suggested solutions could bring the migration statistics in line with other demographic statistics and allow preparing reliable estimates and analyses to inform public policy makers and other researchers.

A first major direction is the improvement in using and matching several data sources to produce migration data. While many researchers favor the use of migration stocks, their reliance on rather static demographic estimates, which leave out almost entirely the fluctuations of the economic conditions that drive most of the international migration, may be unjustified. An optimal solution should consider the advantages and disadvantages of both data.

Another major direction should involve harmonization of data coming from different national sources. Harmonization must take into account the national characteristics of international migration through the establishment of common or comparable definitions of migration, to be used in the harmonized data.

Computation of migration data must appropriately take into account its known caveats (undercoverage, reliability, etc.) and if necessary, make adjustments to bring it in line with what should be their closest-to-truth values.

Aggregation across several data sources could overcome the caveats of administrative data and specific migration data (e.g. holders of permanent resident permits, temporary visa holders, etc.), and provide an indirect assessment of someone's migration status as reflected by his or her actions rather than declarations of intent and/or official records in population registers.

Aggregation can prove useful in the context of renouncing of border controls and free movements of people between countries, and especially in mobility cases involving cross-border and regional commuting, which can go unassessed. Student records and employment information can document such short-term movements.

And, last but not least, the use of specific statistics can assist in improving the coverage of certain groups of migrants. For example, UK health and pension statistics can improve coverage of migrant pensioners and women (Evans et al., 2007).

A proper distinction between temporary and permanent migration and mobility should be a priority in improvement of international migration data. This distinction is increasingly required by various aspects of mobility (e.g. cross-border and regional commuting, short-term student exchange programmes), which do not involve formal changes of residency, and by the ease of transition between the two types which can lead to unreliable data. An increased ability to gauge temporary migration and mobility can lead to an improved ability to estimate illegal migration.

All the above solutions should be complemented by the use of statistical methods. Some statistical techniques are needed in order to harmonize stocks and flows data, on one hand, and adjust bilateral migration flows on the other hand, so that they match one another.

And, last but not least, given the complexity of the issues pertaining to international migration, it may be appropriate to generate a set of comparable, harmonized migration data, which should not replace, but merely offer an alternative to the existing migration data. The latter may be better suited to the economic and social reality of the country that disseminates it and thus be more effective in the appraisal and policy-making of that country. This would also increase the acceptance of the new data, which, given the actual state of affairs and current practices, may take a while until it provides the much-needed gauge of international migration.

As a final remark, while solutions presented in this paper can constitute valid directions for improving international migration statistics, it should be acknowledged that there is still a long way to go until they will be implemented by the National Statistical Offices and be formalized within the frame of European Statistical System. There is definitely need for further research on how to transform these directions into actionable solutions.

ACKNOWLEDGEMENT

This work was co-financed from the European Social Fund through Sectoral Operational Programme Human Resources Development 2007–2013, project number POSDRU/159/1.5/S/134197 „Performance and excellence in doctoral and postdoctoral research in Romanian economics science domain“.

References

-
- ABEL, G. J. Estimating global migration flow tables using place of birth data. *Demographic Research*, 2013, 28(March), pp. 505–546.
- BEER, J. DE, RAYMER, J., ERF, R. VAN DER, WISSEN, L. VAN. Overcoming the Problems of Inconsistent International Migration data: A New Method Applied to Flows in Europe. *Eur J Popul.* 2010, Nov. 26(4), pp. 459–481.
- BOSWELL, C., GEDDES A. *Migration and Mobility in the European Union*. Palgrave Macmillan, 2010.

- BELL, A. M., BLAKE, M., BOYLE, P., REES, P., STILLWELL, J., HUGO, G., BLAKE, M. Cross-national comparison of internal migration: issues and measures. *J. R. Statist. Soc. A*, 2002, Vol. 65, Part 3, pp. 435–464.
- CLARK, C. *Census Population Coverage Error: Results and Methods, Federal Committee on Statistical Methodology Research Conference*. Washington D.C., 2009.
- EUROSTAT. *International migration flows (migr flow) Reference Metadata in Euro SDMX Metadata Structure (ESMS)* [online]. 2013. [cit. 8.7.2014] <http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/migr_flow_esms.htm>.
- EVANS, H., VICKERS, L., WRIGHT, E. Using administrative data sources in the estimation of emigration [online]. *Population Trends*, 2007 (128), pp. 33–40. [cit. 7.7.2014] <<http://www.ncbi.nlm.nih.gov/pubmed/17691539>>.
- FINOTELLI, C., ARANGO, J. Regularisation of unauthorised immigrants in Italy and Spain: determinants and effects. *Documents d'Anàlisi Geogràfica*, 2011, 57, pp. 495–515.
- GHEȚĂU, V. Declinul demografic și viitorul populației României. *Editura ALPHA MDN*, Buzău, 2007.
- HATTON, T. J. The Cliometrics of International Migration: a Survey. *Journal of Economic Surveys*, 2010, 24(5), pp. 941–969.
- HOFFMANN E., LAWRENCE, S. *Statistics on international labour migration. A review of sources and methodological issues*. ILO Geneva, Bureau of statistics, Interdepartmental Project on Migrant Workers, 1994.
- LEMAITRE, B. G. *The Comparability of International Migration Statistics*. OECD Statistics Brief No. 9, 2005.
- NATIONAL INSTITUTE OF STATISTICS – ROMANIA. POP309A – *Emigrants by sex, macroregions, development regions and counties of departure* [online]. 2014. [cit. 8.7.2014] <<https://statistici.insse.ro/shop/index.jsp?page=tem-po3&lang=en&ind=POP309A>>.
- RAYMER, J., WIŚNIEWSKI, A., FORSTER, J. J., SMITH, P. W. F., BIJAK, J. Integrated Modeling of European Migration. *Journal of the American Statistical Association*, 2013, 108(503), pp. 801–819.
- UNSTATS. *Improving the Compilation of International Migration Statistics. Results of a United Nations Workshop*. 2004.
- VASILEVA, K. 6.5 of the EU population are foreigners and 9.4 are born abroad. *Statistics in focus*, 34/2011, Eurostat.

APPENDIX 1

Coverage of migration stocks by annual flows data, 2002–2012

| Country | Belgium | Czech Rep. | Denmark | Germany | Estonia | Ireland | Spain | France | Croatia | Italy | Cyprus | Latvia | Lithuania | Luxembourg | Hungary |
|--------------|---------|------------|---------|---------|---------|---------|-------|--------|---------|-------|--------|--------|-----------|------------|---------|
| Coverage (%) | 99 | 61 | 87 | 96 | 53 | 100 | 63 | 100 | 88 | 131 | 106 | 100 | 100 | 100 | 120 |

| Country | Malta | Netherlands | Austria | Poland | Portugal | Slovenia | Slovakia | Finland | Sweden | UK | Iceland | Norway | Switzerland |
|--------------|-------|-------------|---------|--------|----------|----------|----------|---------|--------|----|---------|--------|-------------|
| Coverage (%) | 88 | 51 | 86 | 783 | 147 | 100 | -393 | 99 | 100 | 74 | 80 | 101 | 103 |

Note: Coverage is computed as emigration less immigration flow data, divided by the annual change in the population due to net migration plus statistical adjustment. Calculations cover the period 2002–2012 remove the highest and the lowest values, and are based on at least 6 annual data points.

Source: Authors' calculations based on Eurostat data <<http://ec.europa.eu/eurostat>>

APPENDIX 2

Coverage of changes in foreign-born population by net immigration, 2010–2012

| Country | Belgium | Denmark | Estonia | Ireland | Spain | Italy | Lithuania | Luxembourg | Hungary |
|--------------|---------|---------|---------|---------|-------|-------|-----------|------------|---------|
| Coverage (%) | 120 | 147 | 121 | 253 | 1 123 | 89 | 554 | 83 | -157 |

| Country | Netherlands | Austria | Slovenia | Finland | Sweden | Iceland | Liechtenstein | Norway |
|--------------|-------------|---------|----------|---------|--------|---------|---------------|--------|
| Coverage (%) | 129 | 277 | -179 | 78 | 120 | 70 | 195 | 128 |

Note: Coverage is computed as net immigration divided by the annual change in the foreign-born population for the entire 2010–2012 period.
Source: Authors' calculations based on Eurostat data <<http://ec.europa.eu/eurostat>>

A Regional Analysis of Romanian Migration Determinants

Elena-Maria Prada¹ | Bucharest University of Economic Studies, Bucharest, Romania

Costin-Alexandru Ciupureanu² | Bucharest University of Economic Studies, Bucharest, Romania

Adrian Otoi³ | Bucharest University of Economic Studies, Bucharest, Romania

Abstract

This paper analyses the determinants of Romanian emigration considering two perspectives: first, the perspective of business environment and labour market and, second, the perspective of social and economic conditions. The analysis uses data from National Statistical Institute and Romanian Register of Commerce for all 42 counties of Romania for the year 2011 and consists of three linear regression models whose dependent variable was the total number of Romanian emigrants declared at 2011 Romanian Census. Results have shown that international migration is strongly correlated with national labour policy. The fact that newly created enterprises have a positive influence on migration show that Romanian business environment is not able to offer competitive salaries and/or working conditions.

Keywords

Business environment, cluster analysis, regression analysis, romanian emigration

JEL code

C38, F22, M20, O10, R10

INTRODUCTION

In the first years after the fall of the iron curtain emigration was mainly driven by ethnic considerations. Subsequently, the Romanians started to migrate to Spain, Canada and the United States (Chindea et al., 2008). Once the Schengen visas were removed in 2001 and Romania joined the European Union in 2007 the emigration took off. The main destination countries for the Romanian emigrants were still Italy, Spain and Germany.

Romania is the biggest workers' remittances recipient within the EU and approximately 80% of these funds originate from the EU, of which more than half comes from Italy and Spain (Comini and Faes-Cannito, 2010). These funds make a substantial contribution to balancing negative current account, support national household consumption and represent an important source of foreign exchange. Although their

¹ Faculty of Cybernetics, Statistics and Economic Informatics, The Doctoral School of The Bucharest University of Economic Studies, Bucharest, Romania. E-mail: elena.prada@gmail.com.

² Faculty of Cybernetics, Statistics and Economic Informatics, The Doctoral School of The Bucharest University of Economic Studies, Bucharest, Romania. E-mail: ciupureanu_alex@yahoo.com.

³ Faculty of Cybernetics, Statistics and Economic Informatics, The Doctoral School of The Bucharest University of Economic Studies, Bucharest, Romania. E-mail: otoi.adrian@gmail.com.

level decreased dramatically (in 2012 workers' remittances represented 2% of GDP compared to 5% in 2004), these flows of funds proved to be more resilient than foreign direct investments funds during the recent economic crisis.

Another negative outcome of emigration is faster ageing of population. According to the data obtained from the Romanian National Institute of Statistics in the past 11 years the medium age of the resident population has risen to 40.9 years in 2013 from 37.8 years in 2002, most of the emigrants being aged between 25–64 years. Also, for the first time after 1968 the Romanian total population has fallen below 20 million inhabitants. Until 2009 the decrease of inhabitants occurred in proportion of 75% due to emigration and 25% due to the negative natural increase, which after 2009 became the most predominant factor.

Ratha (2013) observes that the number of registered foreign citizens in 2012 was about 100 thousands, approximately 0.5% of the total population. From the data obtained from the Romanian Immigration Office most immigrants come from Moldavia, Turkey, Italy, Germany, France and China. Albeit this, from 2010 to 2013 immigration in Romania rose by 4.8 %, the biggest increase in Eastern Europe and Central Asia (Ratha et al., 2013).

The remainder of the paper is organised as follows. Section 1 summarizes some of the literature on migration and section 2 presents the method and data used for analysis. In section 3 it is described the econometric analysis along with main empirical results, while in the last part of the paper are summarized the results and draw conclusions of this analysis.

1 BRIEF LITERATURE REVIEW

The literature on determinants of Romanian migration to Europe reported by the Romanian NUTS 3 regions is scarce. Most of the studies that deal with regional aspects of migration refer to internal migration, for example, using panel data technique Bunea (2012) tried to investigate on the potential determinants of internal migration in Romania using county data for the period 2004–2008 (NUTS 3 level). The dependent variable used was gross migratory flows from the origin country to the destination, while the independent variables consisted of: real GDP per capita, unemployment rate, employment rate, private dwelling rate, degree of urbanization, criminality rate, population density, amenities index, etc. The main results pointed out significant impacts of population size, real gross product per capita, amenity index, road density and crime rate from a static point of view, and significant effects of previous migration ratio, population size and amenity index from a dynamic point of view.

In another study, Martinho (2011) analysed the determinants that affect the labour mobility in Portugal between 1991–2001 at NUTS 3 level and also tested for conditional convergence. The results of OLS estimates with cross section data show that for the level of NUTS 3 and for years considered, the evolution of net migration is explained solely by the availability of housing. The positive sign of the regression coefficient (as expected) means that higher the rate of growth in the number of houses in a region compared with the average of other regions the higher the labour migration into that region. Also, testing for conditional convergence, the OLS estimates show that there is net migration towards the littoral of Portugal and divergence between the continental regions.

In a related study, Kirdar and Saracoglu (2006) examined whether internal migration in the last decades in Turkey has had any effect on the speed of convergence across Turkish provinces. According to the results, contrary to the predictions of the standard neoclassical theory, for 1975–2000 period, internal migration is not conducive to faster convergence across provinces in Turkey. The authors concluded that one possible reason for this outcome is that marginal returns to capital in most net outmigration provinces and regions are relatively lower than those in the net in-migration provinces and regions in Turkey.

Accordingly, the incentives to invest in capital into net-out migration regions may well be less than those in the net in-migration regions. Poot, Ozgen and Nijkamp (2010) measured the impact of the size, skills and diversity of immigration on innovativeness of host regions. For this purpose they

constructed a panel of data of 170 regions in Europe (NUTS 2 level) for the period 1991–2001. The authors found that an increase in patent applications in a region is associated with (i) net immigration; (ii) the share of foreigners in the population of the region; (iii) the average skill level of the immigrants; and (iv) the cultural diversity of the immigrants. The results show that a 1 percentage point increase in the share of foreigners increases patent applications by 0.23% and similarly, a 1% increase in GDP per capita leads to a 1% increase in patent applications. A population increase by 1% increases patent applications by 0.30%.

Kubis and Schneider (2007) examined the regional patterns and determinants of migration flows of young women. The econometric analysis of determinants of regional migration flows gives evidence of the importance of labour market, family-related and educational migration motives. Generally speaking, young women tend to choose regions with good income and job opportunities; in addition they seem to be attracted by regions enabling an appropriate balance between family and career. Furthermore the existence of excellent educational facilities is a significant influence for young women's migration. The German internal migration flows of the year 2005 were explored at the NUTS-3 regional level, i.e. the district level (the sample contained 438 districts).

Focusing on regional unemployment dynamics in Italy over the 1995–2007 period, when a strong flow of out-migration from the South to the North occurred, Basile, Girardi and Mantuano (2010) tried to find out if interregional migration equilibrates regional labour market performances. The panel data results (estimation method of two-stage least square/generalized method of moments) documented that migration flows exerted a strong negative effect on regional unemployment growth rates. In order to assess the effect of migration on regional unemployment disparities in local labour markets, the authors used longitudinal data for 103 NUTS3 Italian regions and four periods (1995–1998, 1998–2001, 2001–2004 and 2004–2007) to construct the dependent variable which measures the three-year dynamics of the provincial unemployment rate.

Using small Italian regions (i.e. provinces) Bratti and Conti (2014) examined the causal effect of foreign immigration on innovation during 2003–2008. Using instrumental variables estimation (based on immigrants' enclaves), they found that the overall stock of immigrants did not have any effect on innovation. However, decomposing the overall effect into the contributions of low and high-skilled migrants shows that an increase of 1 percentage point in the share of low-skilled migrants on the population reduces patent applications by about 0.2%. By contrast, the impact of high-skilled immigrants on innovation is positive, in line with the previous literature, but cannot be precisely estimated. The dataset contained information on demographic and economic indicators for 103 Italian provinces (NUTS 3 level) for the 2002–2009. In their study, Liebig et al. (2014) found that recent migration flows have reacted quite significantly to the EU enlargements in 2004 and 2007 and to changes in labour market conditions, particularly in Europe.

In contrast to the pre-crisis situation and the findings of previous empirical studies, there is tentative evidence that the migration response to the crisis has been considerable in Europe, in contrast to the United States where the crisis and subsequent sluggish recovery were not accompanied by greater interregional labour mobility in reaction to labour market shocks. The OLS estimates suggest that, if all measured population changes in Europe were due to migration for employment purposes – i.e. an upper-bound estimate – up to about a quarter of the asymmetric labour market shock would be absorbed by migration within a year. The number of observed NUTS-2 regions in the EU-27/EFTA and Eurozone estimations was 265 and 167, respectively, with an average of about 1.2 million working-age inhabitants per region for each of the two areas under consideration (Jauer et al., 2014).

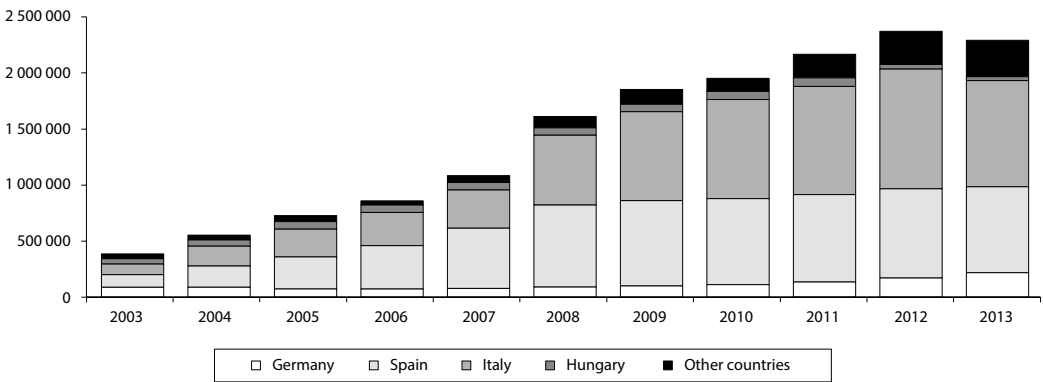
2 METHOD AND DATA

The Romanian citizens represent the biggest foreign community in Italy and Spain. While their number has grown significantly after the Romanian accession to the EU, in the last few years their influx diminished considerably due to the economic and financial crisis. However, according to data obtained from the Italian

National Institute of Statistics, in 2012 the Romanian immigrants to Italy (82 thousands) outnumbered the number of Romanians that left the country (9 thousands), mainly because of the registration policies on migration in Romania which generate inconsistent and non-harmonised data. Also, the Romanians immigrants represented the most mobile foreign community in 2012 (i.e. 64 thousands Romanian immigrants changed their residency across Italy, 18% more than in the previous year). Against this background at the beginning of 2013 in Italy were 951 104 registered Romanian immigrants.

In the past few years due to a high level of unemployment and poor economic conditions Spain became an emigration country. According to data obtained from the Spanish Statistical Office, during 2012 and 2013 more Romanian citizens emigrated than immigrated in Spain, the number of Romanian immigrants reaching 730 340 at the beginning of 2014, with 5% less than in the previous year.

Figure 1 The evolution of Romanian migrants stock within the EU



Source: Eurostat

The data from Figure 1 should be treated with cautious due to the fact it refers only to the registered Romanian citizens across EU Member States and data is missing for some of the countries (e.g. France). On the other hand, according to data obtained from the last census (2011) the number of Romanian emigrants across the World is around 2.3 million persons, a figure well below data obtained from the World Bank and Eurostat.

There are many studies that discuss the determinants of migration regarded from multiple perspectives such as economic or social issues, if macroeconomic determinants of migration are considered. Heid and Larch (2012) showed that migration negatively influences unemployment rate by analysing a panel data set of 24 OECD countries from year 1997 to 2007. Goschin and Roman (2012) showed that there are a series of factors that trigger people to migrate, the most important being that people react positively when they get a better paid job.

In order to analyse what are the main determinants of Romanian emigration the method used was Ordinary Least Squares Multiple Regression Analysis estimated with Stata 12.1, and represented mathematically as:

$$Y' = \varepsilon_i + \alpha + \beta_1 \cdot X_1 + \beta_2 \cdot X_2 + \beta_3 \cdot X_3 + \dots + \beta_k \cdot X_k \tag{1}$$

where: Y' is the endogenous variable;
 X_k are the exogenous variables;

ε_i is the error term;
 α is the constant term.

The data used in our analysis was provided by the Romanian Register of Commerce and by the Romanian National Statistical Institute (INS): the tempo on-line database and data obtained from the 2011 census. All the variables included into analysis are for 2011, so as to match census data.

The 2011 census offers two types of variables, each at the county level:

- temporary international emigration (referring to the total number of Romanians left abroad for less than one year);
- long term international emigration (the total number of persons established abroad for a period greater than one year).

The sum of these two variables as total international emigration registered in 2011 was also included in this analysis.

A survey conducted by Stoiciu et al. (2011), that had the purpose to determine the impact of the economic crisis on Romanian emigration, determined that the main reasons for Romanians to migrate were finding better jobs and the socio-economic situation in Romania. Therefore, emigration determinants were analysed from the perspectives concerning the labour market and social conditions in Romania.

Considering that there are some limits regarding available data, the following variables were chosen:

- Gross Domestic Product per capita as a measurement of development of the county;
- rate of employment for emphasizing the importance of the lack of jobs on people's decision to migrate;
- retirement income which is not included into social protection expenditures;
- social protection expenditures for unemployment (as % of GDP) that includes unemployment benefits, expenditures on professional training, amount paid to employers who have hired graduates for indefinite period;
- newly established enterprises as a sign for the Romanian business environment and also for the labour market;
- inhabitable area regarding social conditions, which is a variable computed as:

Inhabitable area

$$= \frac{\text{The living area built (mp)}}{\text{The stable population in Romania (number of persons)}}$$

The selected variables are for all 42 Romanian counties, in order to show how the Romanian economic system influences migration at a regional level.

Cluster analysis was also included for total migration variable using the dendrogram to design a cartogram of Romanian emigration. Ward's method or Ward's linkage were used, that is based on the sum of least squares of each cluster and selects clusters that minimize the increase of the sum of squares errors (Ward, 1963).

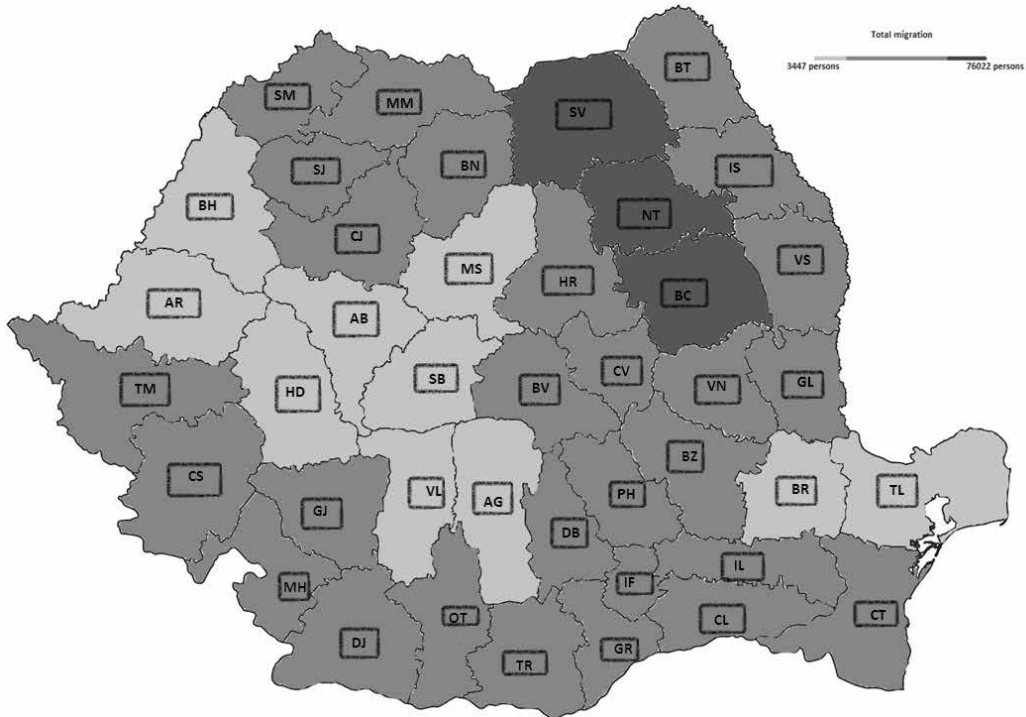
3 EMPIRICAL RESULTS

Based on the data provided by 2011 census an emigration cartogram was designed based on dendrogram analysis of the total migration variable in order to observe whether there are any differences regarding migration between the counties of Romania and pinpoint similarities across regions. Cluster analysis was used for its descriptive nature regarding total migration in Romania.

From the cartogram, designed after the cluster analysis using the Ward's method on the total international migration, it can be concluded that most migration comes from both poor and rich regions

of Romania and that the level of development, usually measured by GDP per capita, of a county correlate at national level with migration moderately. Not all of the poor regions have the propensity to migrate, for example counties as Mehedinți and Călărași where low GDP per capita does not concur with a high number of people who emigrate. Although, it can be observed that the top migration region are Moldova, Nord-West and Nord-East development regions, well known for the poor living standards compared with the rest of the country and also confirmed by the GDP per capita level.

Figure 2 Romanian international migration cartogram



Source: Authors design based on dendrogram analysis usign data from Romanian Census 2011

Secondly, our main concern was to measure the effects of labour market and social factors on Romanian emigration. Therefore, linear regression to explore the relation between migration and a series of variables offering information regarding its direction and intensity was used.

The analysis was focused on three regression models. The dependent variables were extracted from the 2011 census: short-term and long-term migration and the total number of Romanian emigrants which was obtained by summing up the short-term and the long-term migration. The regression models results regarding short-term and long-term migration show that there are differences with respect to employment rate and social protection expenditures. Also, the employment rate, in the case of long-term migration model is not statistically significant whilst the social protection expenditures variable is not statistically significant in the case of short-term migration model.

For the third regression model which has total migration as a dependant variable the employment rate and the social protection variables become statistically significant. The results show that Romanian

emigration is mainly driven by the labour market conditions; i.e. the higher the demand of jobs the lower the emigration rate. Also, the results show that the higher the social protection expenditures the lower the emigration rate.

Labour market conditions are the main reasons of migration, as the rate of employment and the benefits granted to unemployed persons have a strong negative impact on migration. Also, the rate of employment has a negative impact on migration which confirms the new economics of migration theory (people migrate for maximizing their incomes by finding a better paid job). As for retirement income it can observe that it has a positive impact on migration, so people will tend to migrate even though the retirement income will increase. This fact can be interpreted twofold: first, due to the low retirement income and secondly, as it is well known, the retirees persons are not usually migrating and they are a continuously growing number in Romania which will reach to an extent that the social system will not be able to cope with this demographic evolution. So this has an effect on emigration of the young due to social protection for retirement income. a variable regarding the influence of inhabitable area rate over migration was also included in our analysis. The results of this variable were not statistically significant.

Table 1 OLS for labour market factors

| | Temporary international migration | International Migration on long term | Total International Migration |
|---|-----------------------------------|--------------------------------------|-------------------------------|
| Constant | - 3 059.250 | -1 172.628 | -4 231.878 |
| GDP per capita | -1.166*** | -1.094** | -2.260*** |
| Retirement income | 29.705** | 66.451** | 96.156** |
| New enterprises | 2.425*** | 4.130** | 6.555*** |
| Rate of employment | 1 562.513 | -125 979.984* | -124 417.470* |
| Inhabitable are rate | 1 150.723 | 2 225.633 | 3 376.357 |
| Social protection expenditures (for unemployment as % of GDP) | -19 256.827*** | -12 289.279 | -31 546.105* |
| R Square | 0.454 | 0.403 | 0.478 |
| Durbin-Watson | 2.529 | 1.992 | 2.311 |
| F | 4.703*** | 3.828*** | 5.191*** |
| Observations | 42 | | |

Significance: ***p<0.01; ** p<0.05; * p<0.10.

Source: Processed by authors using data provided by INS

Even though new companies are created, Romanians will still tend to migrate. This can be explained by the fact that the Romanian business environment is not competitive enough to offer a reasonable income and better working conditions that can decrease emigration in a sustainable manner.

The result of the regression models as well as the cartogram have been obtained by using SPSS 16 software. Regarding the fit of the three regression models it can be observed that F statistic is significant for all the models. With respect to Durbin Watson, the residuals are not auto correlated for the short-term and long-term migration models, whilst for the total emigration model there is no evidence of no auto-correlation or positive or negative autocorrelation.

Analysing the results of the R2, the independent variables influences the variation of the dependent variable in proportion of 40%, the biggest influence being observed on total migration (47.8%). Therefore, it can be concluded that the labour market conditions in Romania are the main determinant of Romanian emigration.

CONCLUSION

Migration is and will be a major concern among researchers. The analysis regarding Romanian emigration concerns the factors that determine Romanians to emigrate. An OLS model referring to the business environment, labour market conditions, and living conditions in Romania was employed.

The results show that the business environment has serious shortcomings, so even though new companies are being created, the labour conditions and the wages offered are not sufficient as expected and people will further tend to migrate from Romania. Also, another factor that might influence Romanian emigration is the lack of housing, which shows that the low incomes obtained in the country are insufficient for investing in real estate. The cluster analysis shows that the influence is stronger for the East part of Romania.

As a final conclusion, the Romanian Government should promote new strategies to improve the labour market conditions and bolster competitiveness of the business environment. Only starting up new businesses does not retain people in their own country. Also, one should consider that on the long term an immigration policy should be put in place in order to attract either skilled labour force from other countries or to create incentives for return migration (re-migration). This policy will have to overcome the brain drain and the demographic dynamics that negatively influence the pension system.

ACKNOWLEDGEMENTS

This paper was co-financed from the European Social Fund, through the Sectorial Operational Programme Human Resources Development 2007–2013, project number POSDRU/159/1.5/S/138907 "Excellence in scientific interdisciplinary research, doctoral and postdoctoral, in the economic, social and medical fields -EXCELIS", coordinator The Bucharest University of Economic Studies".

Also, Romanian National Statistical Institute collaborated in providing data for this paper.

References

-
- BASILE, R., GIRARDI, A., MANTUANO, M. Interregional migration and unemployment dynamics: evidence from Italian provinces. *Rome: Istituto di Studi e Analisi Economica-Institute for Studies and Economic Analyses (ISAE)*, 2010.
- BRATTI, M., CONTI, C. The effect of (mostly unskilled) immigration on the innovation of Italian regions. *IZA Discussion Paper*, 2014, No. 792.
- BUNEA, D. Modern gravity models of internal migration. The case of Romania. *Theoretical and Applied Economics*, 2012, 4(4), p. 127.
- CANUTO, O., RATHA, D. *Migration and Remittances* [online]. World Bank Fact Book, 2011. [cit. 15.6.2015] <<http://sit-eresources.worldbank.org/INTLAC/Resources/Factbook2011-Ebook.pdf>>.
- CHINDEA, A., MAGDALENA, M. T., HEIKKI, M., ISABEL, P. Migration in Romania: A Country Profile 2008. Migration in the Black Sea Region: Regional Overview. *Country Profiles and Policy Recommendations*, 2008.
- COMINI, D., FAES-CANNITO, F. Remittances from the EU down for the first time in 2009, flows to non-EU countries more resilient. *Statistics in Focus*, 2010, No. 40.
- GOSCHIN, Z., ROMAN, M. Determinants of the remitting behaviour of Romanian emigrants in an economic crisis context. *Eastern Journal of European Studies* 2012, 2(3), pp. 87–103.

- HEID, B., LARCH, M., Migration, Trade and Unemployment. *Economics: The Open-Access, Open-Assessment E-Journal*, 2012, Vol. 6.
- JAUER, J., LIEBIG, T., MARTIN, J. P., PUHANI, P. A. Migration as an adjustment mechanism in the crisis? A comparison of Europe and the United States. *IZA Discussion Paper*, 2014, No. 7921.
- KIRDAR, M., SARACOGLU, S. Does Internal Migration Lead to Faster Regional Convergence in Turkey? An Empirical Investigation. *Discussion Paper, Turkish Economic Association*, 2006, No. 6.
- KUBIS, A., SCHNEIDER, L. *Determinants of female migration: The case of German NUTS 3 Regions*. No. 2007/12, IWH-Diskussionspapiere.
- MARTINHO, V. J. P. D. Analysis of net migration between the Portuguese regions. *arXiv preprint arXiv:1110.5564*, 2011.
- POOT, J., OZGEN, C., NIJKAMP, P. *Immigration and innovation in European regions*. 2010.
- STOICIU, V., STĂNCULESCU, M., ALEXE, I., MOTOC, L., The impact of economic crisis over labour market in Romania. *Friedrich-Ebert-Stiftung*, 2011.
- RATHA, D., EIGEN-ZUCCHI, C., PLAZA, S., WYSS, H., YI, S. Migration and remittance flows: Recent trends and outlook, 2013–2016. *Migration and Development Brief*, 2013, 21, 2.
- WARD, J. H. Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association*, 1963, 58, pp. 236–244.

Reaping the Benefits of Using Integrated Micro-Data for Statistical Purposes... and Beyond

João Cadete de Matos¹ | *Banco de Portugal, Lisbon, Portugal*

Abstract

This paper examines how the *Banco de Portugal* has been exploring the statistical micro-databases available in-house, with the aim to enhance the effectiveness and efficiency of its statistical system.

The use of integrated granular data constitutes the cornerstone of the Bank's long-term strategy as regards its statistical function, and a vital contribution to other areas within central bank's competencies – *inter alia*, monetary policy, financial stability and supervision.

Some examples of areas in which the integrated management of micro-data has added considerable value to the statistics of the *Banco de Portugal*, in particular by assessing the heterogeneity hidden behind aggregate numbers, are shown.

Keywords

Micro-database, data integration, granular data, central bank statistics

JEL code

C81, E58

INTRODUCTION

One of the most significant present characteristics is the constantly changing environment. From medicine to biotechnology, computers to cell phones, there are numerous areas where change has been deep and long-lasting. More than the wide scope of change itself, it refers also to the speed and rhythm with which reality keeps evolving: the changes our sons will witness in the course of their lives will likely be broader than those we are currently observing and even more so compared to those our forefathers experienced.

The financial world is perhaps one of the most affected by the increased pace of innovations. This calls for central banks to be particularly attentive in the fields of financial supervision and regulation, but it also demands from the statistical function to be able to devise solutions that can be quickly adjusted to this developing and challenging landscape, as well as to new and unforeseeable data needs.

¹ Statistics Department, Av. Almirante Reis 71, 1150-012 Lisbon. Portugal. E-mail: jcmatos@bportugal.pt, phone: (+351) 213128342.

Against this background, the paper discusses how the *Banco de Portugal* (hereinafter also referred to as “the Bank”) has been exploring the statistical potential of a number of available micro-databases, which cover different areas of the economy and the financial system, with the aim to enhance the effectiveness and efficiency of its statistical system while keeping the respondents’ burden at an acceptable level. The granular nature of such information, together with a good coverage of the relevant population, offers an increased flexibility as regards the compilation of new statistics and a more rapid response to *ad hoc* data requirements and users’ requests.

The use of integrated micro-databases for statistical purposes constitutes the cornerstone of the Bank’s long-term strategy as regards its statistical function, and a vital contribution to other areas within central bank’s competencies – *inter alia*, monetary policy, financial stability and supervision. We believe that this approach will pave the way to better address the challenges that lie ahead, whichever they may be.

1 WHY MICRO-DATA?

Managing highly detailed and granular databases is the first step of a broader twofold approach; the second is to build a fully integrated data infrastructure. This new integrated management of information approach is expected to generate many benefits (Menezes & D’Aguiar, 2013). On the one hand, it should eliminate unjustified redundancies and lead to the definition of efficient mechanisms for compiling information; on the other hand, it should contribute to the improvement of the data quality and integrity, as well as facilitate the dissemination and agile consultation of the information.

One thing that we have learned during the global financial crisis is that aggregate figures are not sufficient to fully grasp developments in economic variables as they refer to the average of distributions. Quite the contrary, these data should be complemented with micro-data, which enable exploring the heterogeneity hidden behind aggregate numbers. In fact, in many situations, the tails of the distribution provide the most important information, which clearly explains why these data became crucial in recent times.

Accordingly, a move towards micro-data has gradually been advancing at the Bank in recent times, based on and profiting from the many micro-databases managed by the Statistics Department. For instance, the Securities Statistics Integrated System (SSIS) is a security-by-security and investor-by-investor database of both securities holdings and issues. Other such examples are the Central Credit Register (CCR) – which contains granular information on *e.g.* credit exposures – and the Central Balance-Sheet Database (CBSDB) – which holds accounting and financial information covering exhaustively the population of non-financial corporations (NFCs).

All of the aforementioned databases provide comprehensive information concerning their respective domains and are extremely rich. However, to reap the maximum potential of these databases, it is essential to take the additional step and, instead of viewing them in isolation as standalone data repositories, linking them in a single fully integrated high granular data system. By linking the information contained in each individual database, this data system will boost the potential associated with each one, enabling the crossing of data on different institutional sectors and financial instruments.

1.1. Clear benefits for statistical production...

This fully fledged integrated system, encompassing granular data of all institutional sectors and financial instruments, serves the purposes of the different statistical domains, which can, in turn, feed the system with the information they produce, while at the same time tapping into the system for the information they need. In particular, to the extent that they put together all sectors of the economy in a single framework, in an integrated and balanced manner, national financial accounts stand to benefit significantly from such a data system.

Figure 1 schematically illustrates this point. It displays a matrix with institutional sectors in column and financial instruments in row. The dimensions that are currently covered by the Bank’s

micro-databases are highlighted in green, while those that are deemed feasible in the short/medium-run are highlighted in yellow. In more detail, the SSIS gives us granular information on all kinds of securities; the CCR has micro-data regarding loans to all sectors; the CBSD gives us a complete view on the non-financial sector assets and liabilities; the Balance Sheet Information (BSI) on Financial Corporations has granular information on the assets and liabilities of the sector; the BoP/IIP system supplies micro-data on the assets and liabilities of the Rest-of-the-World sector. To complete the few gaps in this matrix, it would be feasible to get information on “Insurance and Technical Reserves” and also more granular information regarding the “General Government” sector. However, our most immediate goal is to get granular data on “Currency and Deposits”, which would allow us, in the shortest possible time span, to have very reasonable micro-data coverage of the economies’ total financial assets and liabilities.

To sum up, a significant amount of this endeavour is well underway and only a few steps – some of which require legal support – are needed to achieve full completion, mostly concerning the household sector.

Figure 1 National financial accounts – Assets and liabilities, by institutional sector and instrument

| | | NFC | | FC | | GG | | HH + NPISH | | RoW | |
|------|------------------------------|--------|---|-------|---|-------------|---|------------|---|-----------|---|
| | | A | L | A | L | A | L | A | L | A | L |
| Goal | Currency and deposits | | | | | | | | | | |
| → | SSIS | | | | | | | | | | |
| → | CCR | | | | | | | | | | |
| → | SSIS | | | | | | | | | | |
| → | FEASIBLE | | | | | | | | | | |
| | Insurance technical reserves | | | | | | | | | | |
| | Other accounts | | | | | | | | | | |
| | | ↑ CBSD | | ↑ BSI | | ↑ FLEASIBLE | | | | ↑ BoP/IIP | |

Note: NFC – Non-financial corporations; FC – Financial corporations; GG – General government; HH – Households; NPISH – Non-profit institutions serving households; RoW – Rest of the world; SSIS – Securities Statistics Integrated System; CCR – Central Credit Register; CBSD – Central Balance Sheet Database; BSI – Balance sheet information; BoP/IIP – Balance of payments and international investment position.

Source: Banco de Portugal

1.2 ... but also for users and for analytical purposes

Providing more complete and detailed statistics in response to users’ needs is a fundamental objective to be pursued by the statistical function. This became particularly evident, namely with the eruption of the global financial crisis, which sparked a whole array of new data needs.

The financial turmoil of 2007–2009 highlighted potential (and actual) gaps in the statistical framework, both at national and international level. In particular, the crisis revealed important gaps in information for the purposes of financial stability analysis, namely concerning counterpart data. The development of micro-databases and administrative records reporting can show a major contribution in overcoming some of these shortcomings (Lavrador, 2010). They permit to develop knowledge about the activities of economic and financial agents at a more detailed level and allow for the drawing of conclusions that would not be possible should one rely solely on aggregated data.

The international financial crises also emphasised the importance of timely, efficient and reliable financial data to support monetary policy and financial stability decisions. Furthermore, the new demands and requirements for the compilation of statistics also revealed that most of the traditional

statistical methods of compilation and analysis do not meet all the data quality requirements. Since then, the development of new methods and tools to manage and improve data quality in financial statistics has become a reality in Statistical Units in many countries. These tools support organisation-wide analysis, the integration of different statistical domains, and enable complex analysis to be made available to decision making bodies (Aguiar & Lavrador, 2012).

One illustrative example where the features of micro-data have proved to be very useful can be found in the analysis of the non-financial sectors indebtedness. Using the available micro-databases, namely the CBSD, the SSIS and the CCR, and taking advantage of the reference tables and related administrative sources, the Bank started to publish, in February 2012, very detailed statistics on non-financial sector indebtedness, with several different breakdowns. First of all, information on the counterparty financing sectors is provided, so as to ascertain the risk exposures of creditor sectors, as well as possible funding strains of debtor sectors. Second, credit to NFCs is broken down according to maturity, as well the economic activity sector and enterprise size; along the same lines, household sector loans are also disaggregated by purpose (housing loans versus consumption and other purposes). Finally, special attention is paid to the public sector. For instance, different public debt definitions are provided – consolidated, non-consolidated, Maastricht debt (relevant for Excessive Deficit Procedures), including/excluding state-owned enterprises.

Another example concerns the usefulness of merging accounting information at the company level from the CBSD with data from the CCR, as a means to analyze the drivers of company's credit risk. This line of research allows for identifying the emerging risks in banks' portfolios, as well as creating modelling tools for the forecasting of default probabilities. In fact, the Bank has recently taken decisive steps towards further exploring the informational potential of the CCR and balance sheet databases in an ongoing project that aims at creating an internal credit assessment system (ICAS). This system will provide the Bank with its own in-house structure to assess credit risk, thus reducing its dependence on external sources. Against the background of the global financial crisis and the shortage of assets liable to be used as collateral in monetary policy operations, these systems have recently been gaining importance within the Eurosystem, as can be seen by the increasing number of NCBs that have introduced them or are planning to do so, namely Austria, Belgium, Germany and Spain.

More broadly, and to sum up, micro-data applications have several other uses in many different fields of central banking. Besides being vital for economic and financial research, they have been progressively gaining a more relevant role in other areas, such as financial stability and supervision activities, monetary policy and risk assessment.

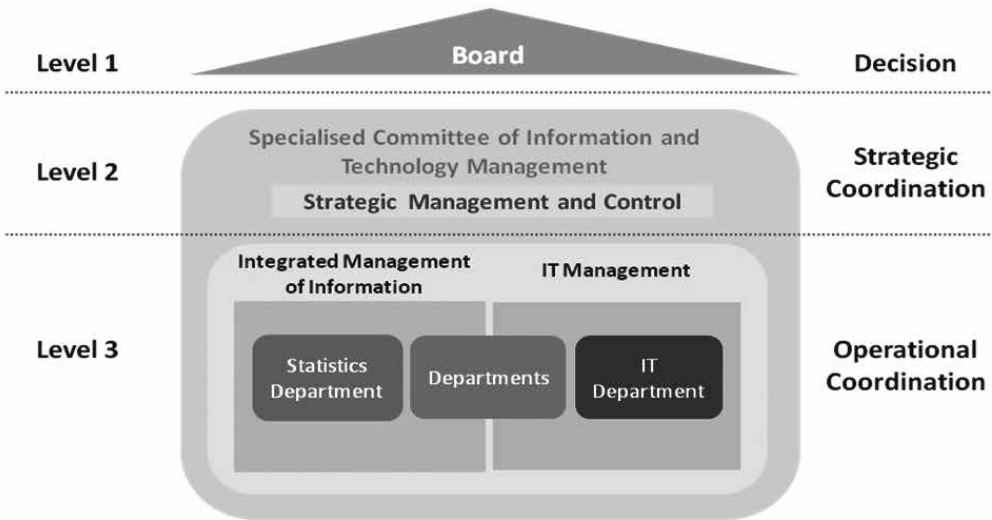
2 HOW TO INTEGRATE MICRO-DATABASES?

Needless to say that achieving such architecture is not an easy task, one which cannot be accomplished overnight. Attaining these goals hinges on an effective cooperation between different functions of the Bank, based on sharing of knowledge and the identification of the information needs of both users and producers. A stepwise approach is warranted, whereby the integration proceeds in a gradual and phased manner. In what follows, I will go through these aspects in more detail.

2.1 Governance structure

The definition of an Information Governance Structure aims to ensure a proper alignment between the strategic and operational levels of decision, which are mediated by the integrated management of information (see Figure 2).

Figure 2 The governance structure



Source: Banco de Portugal

The Statistics Department is in charge of the operational management, including:

- a. Coordinating and monitoring the process of collecting quantitative information from external entities;
- b. Ensuring the central point of contact of the Bank with external entities on the reporting of quantitative information;
- c. Promoting, in conjunction with the IT Department and the user departments, the:
 - Organization of information architectures, namely by identifying objects, features and respective relationships and configuring the domains of integration to manage.
 - Definition of concepts and creation of metadata associated with different information objects in order to avoid duplication and facilitate the understanding/utilization of information.
 - Creation of catalogues/dictionaries/repositories of information available on particular operating systems.
- d. Monitoring the interaction and timely reporting of information to and from external entities.
- e. Analyzing the changing needs of quantitative information identified by other departments.
- f. Guaranteeing the quality of information, defining indicators of their use and ensuring its relevance and auditability.

In this context, various departments that are originators/users of information have the decentralized responsibility, in collaboration with the department accountable for the centralized management of information, of analyzing in a critical manner the data and the metadata that are most important to them and ensure their quality. They also collaborate on the identification of the functional requirements, having in mind the integrated and shared management of information – the identification of functional requirements is the basis for the consolidation of logical and technological architecture.

2.2 Relationships management

Given the large number of stakeholders, a relationships management is essential, namely to introduce greater efficiency in the communication process, normalizing and formatting it in the customer's perspective. It is based on two cornerstone principles:

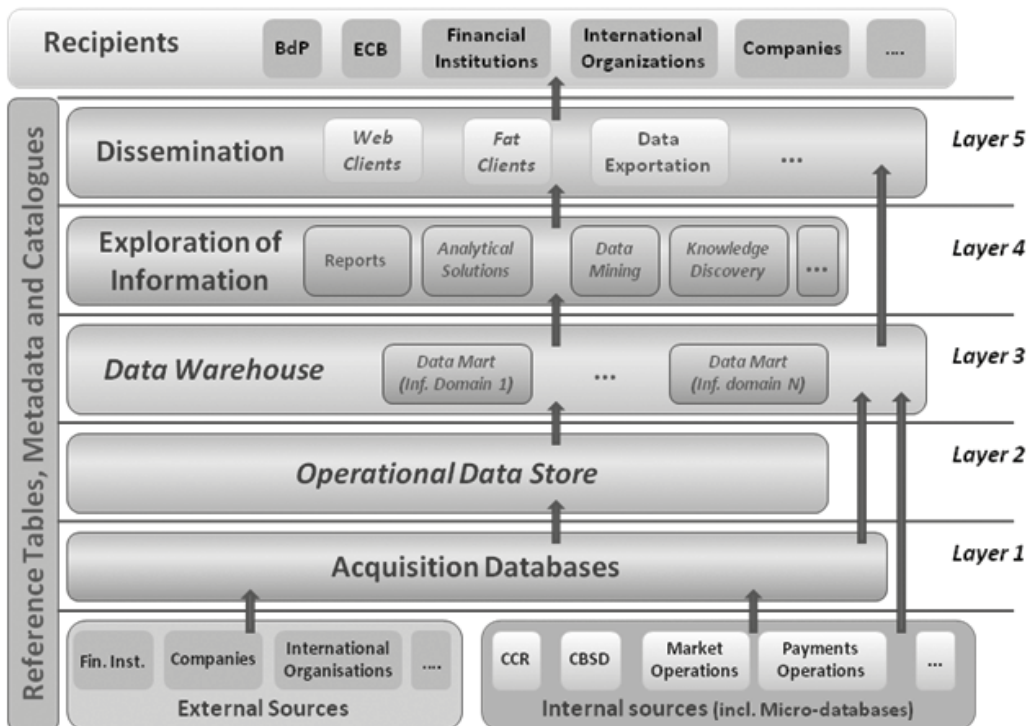
1. Information is a key asset of the Bank so it must be managed in an integrated way.
2. The exploration and analysis of information are distributed activities, typically related to the needs and tasks of each department.

Moreover, an efficient management of information should be based on shared management, which requires a separation of responsibility between the “originator/user of information” and the “manager of information”. The first is best done in a decentralized way by each department, while the latter should be concentrated in a single department. In fact, given that information is a common good, it should be managed by specialists – these specialists are better placed to collect, classify, manipulate, store, recover and disseminate information.

2.3 Information architecture

The infrastructural base of the information management – the so-called Information Architecture – should also be mentioned in this context. Its main aim consists of ensuring the quality, auditability and manageability of the data. It also serves to establish levels of responsibility in the management of information, separating the activities related to the organization and processing of information from the analysis and exploration activities. It is based in five layers where the division between the information management and the exploration and analytics activities occur from the 3rd to the 4th layer, as can be seen in Figure 3. To successfully integrate the different domains, reduce the reporting burden and eliminate redundancies at several levels, it is important to develop high quality reference tables and to maintain up-to-date metadata and catalogues.

Figure 3 Information model



Source: Banco de Portugal

CONCLUSION

The Statistics Department has been pursuing a strategy centred in the integrated management of highly granular data. We believe that this approach will provide us with necessary tools to answer both aggregated and highly detailed queries. Moreover, crossing the different data dimensions will also lead to higher quality standards and efficiency, minimizing the reporting burden. Furthermore, we believe this is extremely useful for our users, both internal and external, to the extent that it enables us to provide tailor-made data with a shorter reaction time.

We cannot anticipate what the future will bring. But the good news is that, to a significant extent, we do not need to consult oracles: we can prepare ourselves to better respond to whatever comes along without necessarily knowing what we will be facing. To this end, we need to proactively invest in becoming flexible. In other words, we can endow ourselves with systems and tools with a sufficient level of manoeuvrability that will enable us to adapt swiftly to whatever comes along.

ACKNOWLEDGMENT

The author would like to thank Daniel Carvalho and Luís D'Aguiar, of the Statistics Department, for their valuable contributions to this paper.

References

- AGUIAR, M. do C., LAVRADOR, I. *Data quality management in statistical systems: the importance of business intelligence*. European Conference on Quality in Official Statistics, Athens, May 2012.
- ALMEIDA, A. M. de, D'AGUIAR, L., CASIMIRO, P. *Promoting enhanced responsiveness to users' data needs: the experience of the Banco de Portugal in exploring the statistical potential of micro-databases*. 58th World Statistics Congress, Dublin, August 2011.
- LAVRADOR, I. *Exploring the statistical potential of micro-databases*. Irving Fisher Committee Conference – Initiatives to address data gaps revealed by the financial crisis, Basel, August 2010.
- MARTINS, C. et al. *Arquitectura de BI – Sistema de Informação Estatística*. Banco de Portugal, June 2008 (not available in English).
- MATOS, J. C., MARQUES, C. *Innovative solutions to compile balance of payments statistics minimising costs and ensuring quality*. Seminar on Business Related Statistics, Luxembourg, February 2012.
- MATOS, J. C. *Drawn to excellence – a sample of issues critical for compiling and disseminating central bank statistics*. Joint Meeting of the y-BIS and the jSPE, Almada, July 2012.
- MATOS, J. C. *Innovative solutions in compiling financial accounts*. Workshop on Developing and Improving Sectoral Financial Accounts, IFC and Central Bank of the Republic of Turkey, Istanbul, May 2014.
- MATOS, J. C. *The information model at Banco de Portugal: innovative and flexible data solutions*. Meeting on Financial Information Needs for Statistics, Macroprudential Regulation and Supervision in Central Banks of Latin America and the Caribbean, CEMLA and Banco de México, Ciudad de México, May 2014.
- MENEZES, P., D'AGUIAR, L. *Reaping the benefits of integrating the micro-databases available at the Banco de Portugal*. XIX Jornadas de Classificação e Análise de Dados (JOCLAD 2012), Tomar, March 2012.
- MENEZES, P., D'AGUIAR, L. *Impact and Benefits of Micro-Databases' Integration on the Statistics of the Banco de Portugal*. 59th World Statistics Congress, Hong-Kong, August 2013.
- New chapter on non-financial sector indebtedness*. Press Release, Banco de Portugal, February 2012.
- SANCHAS, R., AGUIAR, M. *Business intelligence in statistical systems: a stepwise approach*. XIX Jornadas de Classificação e Análise de Dados (JOCLAD 2012), Tomar, March 2012.
- Supplement to the Banco de Portugal Statistical Bulletin 3/2013*. Papers presented in the Workshop on Integrated Management, Porto, June 2013.

Revised Definitions for Statistical Units – Methodology, Application and User Needs.

The Main Conceptual Issues of the “Units Discussion” of the Years 2009–2014

Roland Sturm¹ | *Federal Statistical Office, Wiesbaden, Germany*

INTRODUCTION

In the years 2009 to 2014 in the European Statistical System (ESS) modified definitions for basic statistical units have been proposed and discussed. The author took part in this discussion as regular participant in the ESS “Working Group Business Registers and Statistical Units”, as participant in the ESSnet “Profiling of large and complex multinational enterprise groups” (2009–2013) and as member of the Eurostat task force “Statistical Units” which worked from 2013 to 2015 on the main issues. This paper is based on a contribution which has been presented to the Conference of European Statistical Stakeholders, Roma, 24.–25. November 2014.² Starting from the main conceptual issues and bearing in mind the different functions of units the presentation in Roma addressed the users of statistics: Statisticians need a clear picture of the user needs from which to delineate to appropriate choice of statistical units and their optimised application.

This paper focusses on the issues of the conceptual discussion at the stage it had reached in late autumn of year 2014. In December 2014 Eurostat announced to the Business Statistics Directors’ Group (BSDG) a considerable change of strategy concerning the preparation of the FRIBS (Framework Regulation Integrating Business Statistics). Till then Eurostat had intended to modify by FRIBS the wording and content of the definitions of statistical units, which are a very fundamental foundation of business statistics. In December 2014 the definitions of the units have been excluded from FRIBS. The Statistical Units regulation (Council Regulation 696/93) will continue to be in force and FRIBS will refer to these definitions.

In focus of the units discussion in the years 2009–2014 was the “enterprise” concept of Council Regulation 696/93. This concept remained to great extend mere theory – in practice most Member

¹ Gustav Stresemann Ring 11, D-65189 Wiesbaden, Germany. E-mail: roland.sturm@destatis.de.

² Conference of European Statistical Stakeholders, Roma, 24.–25. November 2014. First Special Focus on Methodological and technical drivers for modernisation of statistics, key aspects: Statistics for decision making – statistical products for an informed society. What statistics can measure and how. Defining European Statistics at the horizon 2020.

States of the EU apply the “legal unit” as sole implementation of the enterprise. This article highlights the elements of the proposal to change the definitions of the enterprise and in consequence also the kind-of-activity-unit (KAU), which is conceptually derived from the enterprise. The proposal which aimed at bringing the definitions in line with developments in business reality raised many doubts and provoked much opposition. This opposition was most prominently expressed in a letter to Eurostat signed by statistical offices of 14 Member states as well as in the outcome of several seminars organized by Eurostat to promote her proposal.

1 STATISTICAL UNITS DEFINITIONS – RELOADED

In the course of the re-framing of official business statistics in the European Union (FRIBS-initiative; FRIBS=Framework Integrating Business Statistics) Eurostat has included an initiative to modify the definitions and operational rules of the statistical units for business statistics. Methodological expert groups (organised as European Statistical System networks – ESSnets) have triggered this in the course of the development of a methodology to profile multinational enterprise groups and in the course of investigating the consistency of today’s business statistics in the EU. The discussion about new definitions focussed most prominently on the statistical unit “enterprise”. Also the “kind-of-activity unit” is essentially affected.

The “unit discussion” has been re-started almost 20 years after some crucial and basic legislation of European business statistics has been laid down by a range of legal acts (Regulations of Council and Parliament of the EU), one of these being the Regulation on Statistical Units. Statistical unit definitions may not be an eye-catcher for statistical users, perhaps even less than classifications and metadata. But all three of these form the fundamentals of statistical work. All our statistical figures mean nothing without the verbal foundations.

The last two decades of official EU business statistics have shown more or less attempts to implement the current unit definitions (as they are laid down in European legislation). The discussion about new unit definitions started in 2009/2010 and has provoked considerable confusion among statisticians. Conception, percipience and also a great deal of interpretation have steamed up the discussion among experts as well as among decision makers.

Two phases of the discussion can be distinguished – and may be characterised by quite different descriptions of the purpose of the initiative to re-discuss the unit definitions:

- “We have to *change* the definitions to enable us to statistically describe today’s realities” (2009–2013).
- “We have to re-phrase the definitions and elaborate on operational rules to make it easier to *apply* the definitions” (2013 – today).

The proposals for revised definitions, initiated and firstly drafted by two ESSnets (“Profiling” and “Consistency”), were the outcome of a one year’s work of the “Task Force on Statistical Units” which has been launched by Eurostat. The Task Force gathers experts of statistical domains in Eurostat and experts of statistical units and business registers from some member states – among which also participants of the two ESSnets mentioned. This Task Force provided the wording of the definitions and the operational rules for the application of the renewed definitions both of which Eurostat intended (till December 2014) to include in the coming European FRIBS regulation.

2 STATE OF THE ART OF THE PROPOSAL FOR NEW DEFINITIONS: CONCEPTUAL DIFFERENCES

2.1 Enterprise

The enterprise is currently defined by the EU Regulation 696/93 on Statistical Units as *“the smallest combination of legal units that is an organizational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit.”*

The first two paragraphs of the proposed definition read as follows:

(1) *An enterprise is an organisational unit which has a sufficient degree of autonomy in decision-making and sells in its own will goods and services to a third party. It can be constituted by one legal unit, a combination of legal units or of parts of legal units. An enterprise carries out one or more activities at one or more locations.*

(2) *An enterprise can correspond to either*

- *a single legal unit not controlled by any other legal unit*
- *an enterprise group as a set of legal units under common control, or*
- *an autonomous part of an enterprise group.*

The differences between the current and the proposed definition of the enterprise may not be obvious at first reading. So what is *new* about the proposed definition?

Autonomy is a first aspect that – compared to the current definition – becomes *more prominent and explicit* in the proposed one. *Autonomy* is the criterion which defines the perimeter of the unit “enterprise”, its demarcation against the “rest of the world”. To this “rest of the world” belong also other parts of an enterprise group to which the enterprise may belong. *Autonomy* is the constituent feature to be looked at for the identification and delineation of the enterprise.

Market orientation is not mentioned explicitly in the latest draft of the proposal although it had been mentioned in many versions of the drafts for two years. In the current wording of the proposal the reference to the market is given indirectly by the phrase “selling of goods and services to a third party” which is explained to have to happen “with an independent buyer on the basis of commercial considerations”. During the discussions about the unit definitions it became clear that the practical application of the enterprise today is not in all cases restricted to market actors. In the proposed definition the phrase “sells in its own will goods and services to a third party” makes clear that enterprises refer to the market sector. Thereby the proposed definition addresses this restriction to market activities *more explicitly*.

Territory is another important aspect in the discussion about the enterprise definition: Both the current and the proposed definitions of the enterprise do not refer to any regional territories. Both are indifferent about the regional coverage of an enterprise. Till date the issue has been “solved” – or better to say “dealt with” – by a “*virtual*” operational rule used by those who apply the current definition of the enterprise: As every statistical office has to produce data at national level (also the European regulations demand to produce data for Member States, that is at national level) everybody who applies the current definition of the enterprise does so in national context. This is not demanded by the current definition itself, it is just an operational rule – maybe not even realized properly as being such – coming from the purpose of the application of the definition: producing national statistical figures based on appropriate statistical units (nationally demarcated enterprises).

The operational rules accompanying the proposed definition address explicitly and *differentiate the reference of the enterprise to territory*: It is stated that where an enterprise is active in more than one country, it shall be called a “global enterprise” (GEN) and its national parts shall be called “truncated enterprises” (TENs). The operational rule explains that even though the truncated enterprises are not autonomous, they are considered to be enterprises. It also states the assumption that from one GEN in most cases there will result one TEN per country, but the delineation of more than one TEN is possible. This makes reference to experiences from global enterprise groups being subject to European profiling. In the process of profiling enterprise groups specific cases of global enterprises occurred for which the delineation of more than one truncated enterprise in a country has been considered sensible.

Legal units are dealt with *differently* in the current and the proposed definition. Conceptually the current definition provides a clear hierarchy of legal unit – enterprise – enterprise group: One or more legal units act as an enterprise and a multitude (more than one) of enterprises can form an enterprise group. The proposed definition does differently: It makes reference to either the legal unit (as the current definition does) or to the enterprise group. As a consequence – to make the definition conceptually consistent – the proposed definition allows building enterprises also by parts of legal units. An enterprise may consist of some *legal units but legal units may also be split* and the parts of them may be apportioned to different enterprises. This novelty can be seen as a very important conceptual motivation for the proposal to change the definition. This is for two reasons: Firstly the phenomenon can be observed in reality (so it exists and should therefore be covered by the definition to make the definition cover the reality). Secondly it may be very helpful for the practical delineation of enterprises by the method of top-down profiling of enterprise groups to identify the enterprises within the enterprise group without having to find out relations between enterprises and legal units (so the change of the definition would be helpful for practical work). The last element of paragraph 2 of the proposed definition (an enterprise as an autonomous part of an enterprise group) deals with this situation. In this case it is left open what the relation of the enterprise to legal units may be.

To summarize the proposed definition of the enterprise allows two constellations which the current definition does not include:

- An enterprise may be identical with an enterprise group.
- Legal units may be split and the parts may be apportioned to different enterprises.

Another implication that has so far not been tackled in the discussions is whether the proposed definition ties the enterprise to be demarcated inside an enterprise group only. The current definition is clearly open on this point since it allows enterprises to form an enterprise group but does not prohibit that enterprises can be formed (as combination of legal units) without reference to an enterprise group and therefore without reference to links of control.

2.2 Kind of Activity Unit (KAU)

The proposed definition states:

A kind-of-activity unit (KAU) is an enterprise, or a part of an enterprise, that engages in only one kind of productive activity, producing goods and services intended to be sold to third parties, or – in case of more than one productive activity - in which the principal productive activity producing goods and services intended to be sold to third parties, accounts for most of the value added.

The delineation of the activities should be based on the valid version of the NACE classification.

For the KAU it should be possible in principle to derive a minimum set of economic indicators related to its production activity (in particular value of production, intermediate consumption (except overhead costs), compensation of employees and gross fixed capital formation of buildings and structures, machinery and equipment as well as employment).

Ancillary activities should not be regarded as a KAU.

The KAU is understood to be a part of an enterprise that is *homogeneous* with respect to the class level of NACE although this level of NACE is not mentioned in the wording of the proposal. The prominent consideration in the “unit discussion” in case of the KAU is not to modify the definition itself, but to make the application of the KAU more operational. This is laid down in the operational rule which introduces thresholds which shall limit the fragmentation of enterprises into KAUs: It suggests that in practical implementation, it should be sufficient to delineate KAUs for:

- enterprises which because of their size (e.g. production value) have significant influence on the aggregated industry data at the level of the at KAU and
- if at least one secondary activity of the enterprise accounts for more than 30% of its total production at class level of the valid NACE classification, – or at least one secondary activity of the enterprise accounts for more than 20% of its total production at the division level of the valid NACE classification.

For enterprises respectively KAUs outside the thresholds it is considered to be justified to see the KAU be equal to the enterprise.

As the KAU is defined as equivalent or part of an enterprise, the *territorial aspect* of the enterprise bears implications for the delineation of KAUs. Strictly speaking the enterprise is seen as an actor regardless of territory. Reading the definitions of enterprise and KAU in context would suggest segregating GENs into multinational KAUs. The operational rule about the enterprise that allows to start with the principle (GEN) and then to apply a deviation (TEN), the latter respecting national territories, results in a consecutive ambiguity regarding the KAUs. A footnote in the operational rules for the KAU indicates that KAUs can also be delineated from TENs. The two ways obviously can result in different results: Starting from the GEN to derive TENs which to segregate into national KAUs or starting from GEN to derive “provisional multinational KAUs” which to segregate into national KAUs. Meanwhile an explanatory document “The Statistical Units Model” has been written which states that in practice the delineation of KAUs is restricted to the national territory. This seems to indicate that they should be delineated from TENs.

As KAUs by definition are to be delineated from enterprises they can only cover *market activities*, or – referring strictly to the latest wording – activities of “selling goods and services”. When this consequence from the definitions became clear the set of proposed definitions was enlarged to provide the KAU concept in two versions – one for enterprises and one for non-market units, which mean “government or non-profit institutional units”.

A kind of activity unit *of a government or non-profit institutional unit* is a unit, which engages in only one kind of productive activity, or – in case of more than one productive activity – in which the principal productive activity accounts for most of the value added.

For the KAU it should be possible in principle to derive a minimum set of economic indicators related to its production activity (in particular (secondary) market sales, intermediate consumption (except overhead costs), compensation of employees and gross fixed capital formation of buildings and structures, machinery and equipment as well as employment). Ancillary activities should not be regarded as a KAU.

The proposed two-fold definition of the KAU points out the fact that the KAU concept still refers to all production of goods and services – a concept which has been altered for the enterprise. The two-fold definition makes sure that the KAU concept can still be applied to all institutional units – that means enterprises in the market sector and government or non-profit institutional units for the non-market-sector – which produce goods and services and therefore produce value added.

3 THE VARIOUS PURPOSES OF (STATISTICAL AND OTHER) UNITS

Based on the conceptual aspects of chapter 2 and approaching the practical application of the definitions in chapter 4 we have to distinguish clearly three functions of units:

- Reporting unit: unit providing information to the data collector.
- Observation unit: unit about which information is provided/reported.
- Statistical unit: unit a statistical output refers to.

Statistical work is surely eased when all three aspects coincide: We ask subjects (respondents, reporting units) about some of their features (as observation units) and produce statistical figures about the quantitative dimensions of these features referring to these subjects (as statistical units). This may be one understandable reason why still many statisticians stick an equivalence of the legal unit and the ‘enterprise’. It makes work easier.

Reasons why statisticians make use of legal units are:

- The possibility to *identify* them, since – like other units from the administrative world – they are defined and addressed by various public administrations.
- Data for statistical use can be *attributed* to them, e.g. financial accounting data or data on persons, like social security data about employment.
- Availability of data to *collect* from administrative bodies (which is easier for statisticians than collecting all data themselves by surveys).

These three aspects all refer to the use of legal units as *observation units*. Of course also their use as *reporting units* to address them as respondents in surveys should be mentioned.

There are also reasons not to make use of legal units. These aspects belong to the (partly missing) usability of legal units as *statistical units*:

- If we want to observe figures about complex enterprises (these are enterprises consisting of more than one legal unit) the unconsolidated flows between the legal units inside these enterprises disturb the picture of the observation unit (the complex enterprise).
- Legal units may not be autonomous and data on legal units may then not be meaningful but give a wrong picture, disturbed e.g. by non-market prices.

Applying the definitions of the statistical units “enterprise” and “KAU” implies to put efforts in distinguishing between reporting and observation units (for data collection) and statistical units (for data compilation and publication). If statisticians have to invest more to produce future’s appropriate statistics, they have to make sure to allocate their resources according to user needs. As described in chapter 2 the discussion on the definitions highlighted some crucial and decisive aspects of the units “enterprise” and “KAU”. Therefore clarification would be helpful about the users’ needs concerning these aspects of the units.

4 ADDRESSING THE USERS OF STATISTICS

There are interrelations between *definitions* of statistical units, the *operational rules* and their actual *application*:

- The *definitions* should capture decisive characteristics of units which are important from conceptual and analytical view. As concepts and analyses serve practical purposes these definitions are driven of course by issues of real life, they are not “purely academic”.
- The *operational rules* describe in more detail how the definition should be understood or how it can be handled in reality. Therefore the operational rules build a bridge between definitions – which should be concise but also as short as possible in wording – an application. When drafting definitions and operational rules it sometimes has to be worked out what belongs to the “pure” definition and what is already “practical” and therefore belongs to the operational rule.
- The *application* of the units starts by the decision which unit to choose for which statistical purpose. Operational rules often have to be detailed further and it has to be worked out how to handle the manifold practical aspects, e.g. how to collect data from respondents about observation units and how to transform this data to get figures for the statistical units.

The third aspect – application – cannot be dealt with extensively by a single expert group like the Task Force on Statistical Units. The application aspect belongs to the conceptual and methodological work of the domain statisticians. As these statisticians produce statistics to serve user needs it is ultimately the users’ needs that should determine the choice and the application of the statistical units.

All relevant users have to be addressed and asked for their views about the proposals to re-define the named statistical units “enterprise” and “KAU”. Analyses of the consequences of the proposed definitions – both methodological and practical – so far only scratch the surface. Many users of the statistical units’ definitions are just becoming aware that something is going on these days. Some are unsettled since they feel not able to think through the implications in short time. If we accept that the Task Force has worked well on content and wording for the *definitions* and the *operational rules* then we can take these two as a base to talk now (meaning in the years to come from 2014) about *application*. This should start by impact analyses, followed possibly, if needed by new statistical concepts and methodologies for the domain statistics and should consequently result in more appropriate statistical figures compared to the present ones.

Market orientation:

The proposed definition of the enterprise provides a clearer description of the aspect of market orientation. It makes clear that enterprises belong to the market sector and to the market sector only. If statistical figures shall describe the market economy this can therefore be expressed more clearly by using the proposed enterprise definition and call the statistics based on them “enterprise statistics”. Statistics that cover more than the market sector instead have to be named differently since they describe not only the activities of enterprises but also the activities of other institutional units besides market actors.

“Purity” in activity:

The obvious change in dealing with this aspect is done in the proposed definition of the KAU. As explained in chapter 2 thresholds have been introduced that allow for less purity in activity regarding the class of NACE. The thresholds introduced for the application of the KAU concept tend to move the KAU (in the practical application) towards the enterprise concept in the sense as the latter has been applied till now which is to take every legal unit as an enterprise). The “real” conceptual enterprise, although base for statistical figures which are prominently published by reference to NACE, is by definition not a unit which gives much information about NACE-based activity.

Also the proposed enterprise definition affects the “purity” issue: The larger the enterprises the less stringent the connection to NACE purity tends to be. NACE attribution merely means an indication of a “main” or “principal” activity which describes no more but that it is the activity of the highest relative score. The aim to broaden the application of the enterprise concept (and to abandon the common practice to simply use legal units instead of building enterprises as combination of legal units) justifies drawing attention to this aspect. Using complex enterprises diminishes the informative value of activity codes attributed to them. The breaking down of GENs into their TEN parts brings along the issue of double NACE coding of GEN and TENs.

Territory:

As explained, the current and the proposed definitions of the enterprise do not refer to any regional territories. Both are *indifferent* about the regional coverage of an enterprise. The perception that the purpose of a “new” definition was driven by the necessity to catch the multinational reality of big enterprises occupied much of the discussion among statisticians in the years 2009–2013. The multinational aspect has been highlighted of course by the circumstance that the proposal to re-think the definition – as described in chapter 1 – has been promoted by an ESSnet that dealt with the profiling of multinational units (enterprise groups as well as enterprises). The well known argumentation is: Economic (autonomous) actors act more and more globally – therefore enterprise statistics have to focus on global enterprises.

The work of the EU-Profiling-ESSnet of the years 2009 to 2013 surely questioned the practical handling of the current enterprise definition by putting emphasis on the issue that building actors (enterprises)

according to national borders was no longer appropriate in case of multinational groups. By the intensive promotion of the GEN concept the belief has been highlighted, that for the big international economic actors the relevance of the data was no longer given if data refers to national borders, since the parts of a multinational enterprise that are situated within the territory of a country are more or less random. This of course would have fundamental consequences for some of our most prominent economic statistics. Essentially the GEN-approach implies to go for *global* statistical figures – global figures meaning neither national ones nor European ones. Global economic actors care no more about European (or EU) borders than they care about national borders.

Since the current and the proposed definition allow generating “global enterprises” the decisive question is: What do users think of it? The production of statistical figures is so far organized according to national borders and the figures themselves refer to a national territory and to statistical units that are shaped to be within this national territory. The European statistical system – Structural Business Statistics (SBS), Foreign affiliates Statistics (FATS), Short Term Statistics (STS), National Accounts (NA) – and more – is aligned to national borders.

- Shall Structural Business Statistics (SBS) in the future describe a world of multinational actors?
- Shall National Accounts be replaced by European Accounts (or EU Accounts?) – or even World Accounts?

The distinction between “global” and “truncated” enterprises has been established, the truncated enterprises thereby being the national parts of the multinational enterprises. Autonomy has been attributed to the multinational enterprises (“global enterprises” – GEN), or to say it more precisely, autonomy was the criterion to delineate and demarcate the GEN. As a logical consequence, the national parts of these enterprises – the TENs – were necessarily *not* autonomous (since if they were they would be the enterprises and no need would be to truncate artificial parts). Figures for turnover of the TENs will not sum up to the turnover of the GEN since the consolidation within the units differ. NACE code of GEN and its TENs can differ so summing up of TEN statistics to multinational figures will differ from multinational figures based on GENs.

Discussions with users of statistical data, impact analyses or likewise actions are not very prominent so far. They would bring the chance to delineate – starting from the purpose of statistical outputs – the appropriate statistical units, as these are one of the very basic ingredients for the production of statistical figures. Two (maybe arbitrary) observations:

- Regarding National Accounts it has been stated lately (to be found in the 21st Meeting of the European Statistical System Committee Luxembourg 14th and 15th May 2014, item “Reports from Directors’ Groups”): “Eurostat underlined the fact that, as regards statistical units, FRIBS will not have any negative practical or theoretical impacts on national accounts.”
- Regarding EU short term statistics (STS) – a statistical domain which can be observed to already react to the aspects mentioned – Eurostat proposes no longer to use the enterprise as statistical unit but to refer solely to KAU in the future.

In tendency the proposed KAU definition moves towards the present definition of the enterprise (as it is supposed to be applied) whereas the proposed enterprise definition puts more emphasis on the multinational aspect of enterprises. Can announcements like the two mentioned be interpreted as statements how to make use of the new focal points of the proposed definitions? Or are they to be seen as attempts to avoid to be affected by the proposed changes in the definitions? Much clarification is needed.

CONCLUSION

This paper focussed on the issues of the conceptual discussion at the stage it had reached in late autumn of year 2014. As mentioned, the proposal to change the definitions has been cancelled. In exchange Eurostat in early 2015 started the first steps of an infringement procedure for the majority of the Member States to

enforce the application of the enterprise definition as defined by current European statistical law. Action plans and time tables have to be provided which describe the implementation efforts. In consequence, business statistics will change conceptually and by figures in the coming years apart from the changes connected with FRIBS. The directors of both business statistics and National Accounts have agreed in a notice of intention to apply the EU-enterprise concept in due time. Whether and when the ideas which lay behind the proposals to change the definition of the enterprise – as discussed here – will come up again has to be awaited.

References

- EUROPEAN UNION. *Council Regulation (EEC) 696/93 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community*. Official Journal of the European Communities No L 76/1, 1993.
- EUROPEAN UNION. *Regulation (EC) No 295/2008 of the European Parliament and of the Council of 11 March 2008 concerning structural business statistics (recast)*. Official Journal of the European Union L 97/13, 2008.
- EUROPEAN UNION. *Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union*. Official Journal of the European Union L 174/1, 2013.
- EUROSTAT. *The Statistical Units Model (Version: 15 May 2014), version presented to the Business Statistics Directors Group Meeting 24 June 2014*. 2014.
- STURM, R. *A new statistical definition of the enterprise – conceptual and practical implications*. Presented at the Meeting of Groups of Experts on Business Registers, organized jointly by UNECE, Eurostat, OECD, Geneva, 2013.
- STURM, R. *Revised definitions for statistical units – methodology, application and user needs*. Presented at Conference of European Statistical Stakeholders, Roma, 24.–25. November 2014.

Recent Publications and Events

New Publications of the Czech Statistical Office

Expenditures and Consumption of Households Included in the Household Budget Survey in 2014.

Prague: CZSO, 2015.

Focus on women, on men. Prague: CZSO, 2014.

Household Income and Living Conditions in 2014. Prague: CZSO, 2015.

Tendence makroekonomického vývoje a kvality života v České republice v roce 2014 (Trends of Macroeconomic Development and Quality of Life in the Czech Republic in 2014). Prague: CZSO, 2015.

Other Selected Publications

ALDCROFT, D. H., MOREWOOD, S. *The European Economy Since 1914.* 5th Ed., London, New York: Routledge, 2013.

BLITZSTEIN, J., K., HWANG, J. *Introduction to Probability.* New York: CRC Press, 2015.

Forests in the ECE Region. Geneva: United Nations Economic Commission for Europe, 2015.

HARE, P., TURLEY, G., eds. *Handbook of the economics and political economy of transition.* New York: Routledge, 2013.

HESS, P., N. *Economic Growth and Sustainable Development.* New York: Routledge, 2013.

KONISHI, S. *Introduction to Multivariate Analysis. Linear and Nonlinear Modeling.* Tokyo: CRC Press, 2014.

MOHANAN, J. F. *Numerical Methods of Statistics.* 2nd Ed., Cambridge University Press, 2011.

National Accounts of OECD Countries 2006–2013. OECD, 2015.

SLOANE, P., LATREILLE, P., O'LEARY, N. *Modern Labour Economics.* London, New York: Routledge, 2013.

SUHOV, Y., KELBERT, M. *Probability and Statistics by Example: Basic Probability and Statistics.* 2nd Ed., Cambridge University Press, 2014.

SVEJNAR, J., KANBUR, R., eds. *Labour Markets and Economic Development.* London, New York: Routledge, 2013.

Conferences

The **18th International Scientific Conference Applications of Mathematics and Statistics in Economics (AMSE 2015)**, organized each year by three Faculties of three Universities from three countries (University of Economics, Prague, Czech Republic; Matej Bel University in Banská Bystrica, Slovakia; and Wrocław University of Economics, Poland), took place in the Czech Republic in **Jindřichův Hradec** from **2nd to 6th September 2015**. More information available at: <http://amse2015.cz/conference>.

The **8th International Scientific Conference RELIK 2015 (Reproduction of Human Capital – mutual links and connections)**, organized by the Department of Demography, Faculty of Informatics and Statistics at the Economic University, Prague, will this year be held in **Prague** during **November 12–13**. The conference is intended for engineers, students, staff of public institutions and NGO, representatives of commercial sector and all other interested parties. Proceeding languages are Czech, Slovak and English. More information available at: <http://relik.vse.cz>.

Papers

We publish articles focused at theoretical and applied statistics, mathematical and statistical methods, conception of official (state) statistics, statistical education, applied economics and econometrics, economic, social and environmental analyses, economic indicators, social and environmental issues in terms of statistics or economics, and regional development issues.

The journal of *Statistika* has the following sections:

The *Analyses* section publishes high quality, complex, and advanced analyses based on the official statistics data focused on economic, environmental, and social spheres. Papers shall have up to 12,000 words or up to twenty (20) 1.5-spaced pages.

The *Methodology* section gives space for the discussion on potential approaches to the statistical description of social, economic, and environmental phenomena, development of indicators, estimation issues, etc. Papers shall have up to 12,000 words or up to twenty (20) 1.5-spaced pages.

The *Book Review* section brings reviews of recent books in the field of the official statistics. Reviews shall have up to 600 words or one (1) 1.5-spaced page.

In the *Information* section we publish informative (descriptive) texts. The maximum range of information is 6 000 words or up to 10 1.5-spaced pages.

Language

The submission language is English only. Authors are expected to refer to a native language speaker in case they are not sure of language quality of their papers.

Recommended Paper Structure

Title (e.g. On Laconic and Informative Titles) — Authors and Contacts — Abstract (max. 160 words) — Keywords (max. 6 words / phrases) — JEL classification code — Introduction — ... — Conclusion — Annex — Acknowledgments — References — Tables and Figures

Authors and Contacts

Rudolf Novak*, Institution Name, Street, City, Country
Jonathan Davis, Institution Name, Street, City, Country
* Corresponding author: e-mail: rudolf.novak@domain-name.cz, phone: (+420) 111 222 333

Main Text Format

Times 12 (main text), 1.5 spacing between lines. Page numbers in the lower right-hand corner. *Italics* can be used in the text if necessary. Do not use **bold** or underline in the text. Paper parts numbering: 1, 1.1, 1.2, etc.

Headings

1 FIRST-LEVEL HEADING (Times New Roman 12, bold)

1.1 Second-level heading (Times New Roman 12, bold)

1.1.1 Third-level heading (Times New Roman 12, bold italic)

Footnotes

Footnotes should be used sparingly. Do not use endnotes. Do not use footnotes for citing references (except headings).

References in the Text

Place reference in the text enclosing authors' names and the year of the reference, e.g. "White (2009) points out

that..."; "... recent literature (Atkinson et Black, 2010a, 2010b, 2011, Chase et al., 2011, pp. 12–14) conclude...". Note the use of alphabetical order. Include page numbers if appropriate.

List of References

Arrange list of references alphabetically. Use the following reference styles: [for a book] HICKS, J. *Value and Capital: An inquiry into some fundamental principles of economic theory*. Oxford: Clarendon Press, 1939. [for chapter in an edited book] DASGUPTA, P. et al. Intergenerational Equity, Social Discount Rates and Global Warming. In PORTNEY, P., WEYANT, J., eds. *Discounting and Intergenerational Equity*. Washington, D.C.: Resources for the Future, 1999. [for a journal] HRONOVÁ, S., HINDLS, R., ČABLA, A. Conjunctural Evolution of the Czech Economy. *Statistika, Economy and Statistics Journal*, 2011, 3 (September), pp. 4–17. [for an online source] CZECH COAL. *Annual Report and Financial Statement 2007* [online]. Prague: Czech Coal, 2008. [cit. 20.9.2008]. <<http://www.czechcoal.cz/cs/ur/zprava/ur2007cz.pdf>>.

Tables

Provide each table on a separate page. Indicate position of the table by placing in the text "insert Table 1 about here". Number tables in the order of appearance Table 1, Table 2, etc. Each table should be titled (e.g. Table 1 Self-explanatory title). Refer to tables using their numbers (e.g. see Table 1, Table A1 in the Annex). Try to break one large table into several smaller tables, whenever possible. Separate thousands with a space (e.g. 1 528 000) and decimal points with a dot (e.g. 1.0). Specify the data source below the tables.

Figures

Figure is any graphical object other than table. Attach each figure as a separate file. Indicate position of the figure by placing in the text "insert Figure 1 about here". Number figures in the order of appearance Figure 1, Figure 2, etc. Each figure should be titled (e.g. Figure 1 Self-explanatory title). Refer to figures using their numbers (e.g. see Figure 1, Figure A1 in the Annex).

Figures should be accompanied by the *.xls, *.xlsx table with the source data. Please provide cartograms in the vector format. Other graphic objects should be provided in *.tif, *.jpg, *.eps formats. Do not supply low-resolution files optimized for the screen use. Specify the source below the figures.

Formulas

Formulas should be prepared in formula editor in the same text format (Times 12) as the main text.

Paper Submission

Please email your papers in *.doc, *.docx or *.pdf formats to statistika.journal@czso.cz. All papers are subject to double-blind peer review procedure. You will be informed by our managing editor about all necessary details and terms.

Contacts

Journal of Statistika | Czech Statistical Office
Na padesátém 81 | 100 82 Prague 10 | Czech Republic
e-mail: statistika.journal@czso.cz
web: www.czso.cz/statistika_journal

Managing Editor: Jiří Novotný

phone: (+420) 274 054 299

fax: (+420) 274 052 133

e-mail: statistika.journal@czso.cz

web: www.czso.cz/statistika_journal

address: Czech Statistical Office | Na padesátém 81 | 100 82 Prague 10 | Czech Republic

Subscription price (4 issues yearly)

CZK 372 (incl. postage) for the Czech Republic,

EUR 110 or USD 165 (incl. postage) for other countries.

Printed copies can be bought at the Publications Shop of the Czech Statistical Office (CZK 66 per copy).

address: Na padesátém 81 | 100 82 Prague 10 | Czech Republic

Subscriptions and orders

MYRIS TRADE, s. r. o.

P. O. BOX 2 | 142 01 Prague 4 | Czech Republic

phone: (+420) 234 035 200,

fax: (+420) 234 035 207

e-mail: myris@myris.cz

Design: Toman Design

Layout: Ondřej Pazdera

Typesetting: Chráněná grafická dílna Slunečnice, David Hošek

Print: Czech Statistical Office

All views expressed in the journal of *Statistika* are those of the authors only and do not necessarily represent the views of the Czech Statistical Office, the Editorial Board, the staff, or any associates of the journal of *Statistika*.

© 2015 by the Czech Statistical Office. All rights reserved.

95th year of the series of professional statistics and economy journals of the State Statistical Service in the Czech Republic: *Statistika* (since 1964), *Statistika a kontrola* (1962–1963), *Statistický obzor* (1931–1961) and *Československý statistický věstník* (1920–1930).

Published by the Czech Statistical Office

ISSN 1804-8765 (Online)

ISSN 0322-788X (Print)

Reg. MK CR E 4684

