



ECONOMICS RESEARCH CENTRE
UNIVERSITY OF CYPRUS

ANNUAL REPORT 2018
AND
RESEARCH PLAN 2019

The Economics Research Centre (CypERC) of the University of Cyprus is an independent, non-profit organization aiming at promoting scientific knowledge in economics, mainly on topics of interest to Cyprus and Europe.

CypERC is managed by the Centre's Council and the Academic Council. The Centre's Council is composed of five to nine members from both the academic community and outside the academia; it advises the Director of the Centre on selecting research topics of interest to Cyprus. The Academic Council oversees the organisation and execution of research and consists of project coordinators and research fellows at CypERC.

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The views expressed in the CypERC publications are the authors' views and do not necessarily represent the CypERC and its sponsors.

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Professor Elena Andreou

CypERC Director

March 2019

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Introduction - Summary

The research activities of the Economics Research Centre (CypERC) in 2018 focused on a wide range of applied economic issues concerning Cyprus and Europe. Research funding at CypERC came from competitively earned grants from the European Union, the Cyprus Research Promotion Foundation, and the University of Cyprus, as well as from sponsorships from the Ministry of Finance and the Central Bank of Cyprus.

The research topics investigated at the Centre in 2018 include the following: the measurement of the wage gap between temporary and permanent workers in Cyprus; the impact of austerity measures on the public – private sector wage gap in Europe; a process evaluation of aspects of the social protection system in Cyprus; an evaluation of the impact of Active Labour Market Policies in Cyprus, the construction of a unified database of Household Budget Surveys, the Survey of Health, Ageing, and Retirement (SHARE) in the case of Cyprus, a tax-benefit microsimulation model for the European Union-EUROMOD; construction of forecasts for economic activity in sectors of the Cypriot economy using various methodologies; the estimation of residential property price indices using data on asking prices, the construction of uncertainty indicators and their impact on economic activity in euro area countries; a study of the determinants of non-performing loans in Cyprus, a study which explores cost-effective greenhouse gas abatement options for Cyprus. In addition, research supervised by Prof. Christoforos Pissarides through project entitled “Employment in Europe” funded by the European Research Council included studies on the following: the role of gender and skill in social subsidies and marketization, geographical proximity and open innovation of SMEs in Cyprus, innovation policies of Cyprus during the global economic crisis and earnings flexibility in Spain during the Great Recession.

The dissemination of research results is mainly carried out through a bi-annual Journal, the Cyprus Economic Policy Review Journal, a bi-annual newsletter, the quarterly bulletin “Economic Outlook”, and the monthly bulletin “Business and Consumer Surveys” The Economic Policy / Analysis Papers present the methodologies as well as detailed empirical results. The results of the research work carried out in the CypERC are also presented in meetings and conferences.

The CypERC continues to put emphasis on high-quality research, ongoing training of research staff as well as the creation of post-doctoral positions.

I. Activities 2018

I.1 Administrative activities

I.1.1 Staff

In 2018, CypERC employed a Director, an Assistant Director, fourteen researchers (Special Scientists and Research Associates) and an administrative assistant.

In 2018, eight faculty members of the Department of Economics participated in the Academic Council of the Centre - Prof. Christoforos Pissarides, Prof. Elena Andreou, Prof. Sofronis Clerides, Prof. Theofanis Mamuneas, Associate Prof. Andros Kourtellos, Associate Prof. Panayiota Lyssiou and Assistant Prof. Nikos Theodoropoulos. The members of the Academic Council are research coordinators of programmes earned by CypERC, mainly funded under competitive conditions mainly by the European Union. These research programmes fund the employment of researchers at CypERC. In addition to bringing external funding to the University and offering employment to researchers, these programmes contribute to academic excellence and international dissemination of research carried out at the Centre and the Department of Economics, University of Cyprus.

In addition, in 2018 the Centre collaborated with eight academics, mostly faculty members of the Department of Economics of the University of Cyprus. The employment of academic advisors at the Centre has proved to be extremely useful as it strengthens cooperation between CypERC researchers and experienced academics and improves the quality of research as well as the training of young researchers. It also enhances the cooperation of the Centre with the Department of Economics and other research centres in Cyprus and abroad. Furthermore, collaboration between CypERC and academics helps to further broaden the range of topics researched, by providing specialised knowledge for the analysis of economic phenomena and economic policies both locally and internationally. The eight academic advisors at CypERC in 2018 were the following: Emeritus Prof. Louis Christofides, Prof. Theofanis Mamuneas, Prof. Sofronis Clerides, Associate Prof. Andros Kourtellos, Associate Prof. Panayiota Lyssiou, Assistant Prof. Nikos Theodoropoulos, Associate Prof. Theodoros Zachariadis, and Associate Prof. Christos Savvas.

I.1.2 Funding of research activities

Funding at CypERC came from competitively earned grants from the Cyprus Research Promotion Foundation, the European Union and the University of Cyprus, as well as from sponsorships from the Ministry of Finance and the Central Bank of Cyprus. More specifically, funding in 2018 was as follows:

(i) Sponsorships

Central Bank of Cyprus

Ministry of Finance

(ii) Earmarked Sponsorships

Central Bank of Cyprus and Ministry of Finance for the construction of forecasts for sectors of the Cypriot economy.

(iii) Contracted Research Projects

Title	Source of funding	Co-ordinator	Duration
Employment in Europe – European Research Council Advanced Grant (ERC Advanced)	European Research Council	Prof. C. Pissarides	2013-2018
Joint Harmonised EU Programme of Business and Consumer Surveys: Cyprus	(1) European Commission (DG-ECFIN) (2) Ministry of Finance (3) University of Cyprus	Prof. E. Andreou	2015-2021
The Survey of Health, Ageing and Retirement in Europe - European Research Infrastructure Consortium (SHARE-ERIC): Cyprus	(1) European Commission (SHARE-ERIC) (2) Ministry of Finance	Assistant Prof. N. Theodoropoulos	2016-2019
Regular maintenance of the EUROMOD tax-benefit microsimulation model and preparation of its transfer to the European Commission	European Commission	Associate Prof. P. Lyssioutou	2018
Mixed Data Sampling (MIDAS) models: Theory and Application	Research Promotion Foundation (RESTART 2016-2020, Excellence Hubs)	Prof. E. Andreou	2019-2021
Dynamic consumer behavior in car ownership	Research Promotion Foundation (RESTART 2016-2020, DIDAKTOR Post-Doctoral Research)	Prof. S. Clerides (Post-Doctoral researcher: A. Adamou)	2018-2020
Mixed Data Sampling models (MIDAS)	University of Cyprus	Prof. E. Andreou	2017-2019
Consumer Planning	University of Cyprus	Prof. S. Clerides	2017-2018
The Econometrics of Intergenerational Mobility	Marie Skłodowska-Curie fellowship MetricIMo	Associate Prof. Andros Kourtellos	2016-2019

(iv) In-kind contributions

The Department of Economics contributed 50% of a Professor's working time to serve as the Director of the Centre. The University of Cyprus contributed to the full time of a permanent member of Special Teaching Staff to serve as Assistant Director and an administrative assistant, and provided office spaces and equipment.

I.1.3 Dissemination of research results

The research output of the Centre is disseminated by publications distributed to a large number of electronic subscribers (more than 4000) including the media, domestic public and private organisations and businesses, international organisations with interest in the Cyprus economy, academics in Cyprus and abroad. These publications are available on CypERC's website (<http://ucy.ac.cy/erc/en/>). Currently the dissemination of research results is carried out via the following publications:

(i) Journal

Cyprus Economic Policy Review. The Cyprus Economic Policy Review is published bi-annually by CypERC. The objective of the Review is to publish high quality papers on European and global economic issues of interest to Cyprus, appealing to a broad audience of policymakers and practitioners. (<http://ucy.ac.cy/erc/en/publications/cyprus-economic-policy-review>)

(ii) Working paper series

Economic Policy/Analysis Papers. This series publishes research results along with the technical/analytical details (models/methods) accompanying them. The articles in this series are subject to a strict editorial procedure to ensure a high quality of content and presentation. They are distributed to a large number of interested recipients in Cyprus including policy makers, practitioners and academics. They are available on the website of CypERC together with their corresponding summaries/abstracts (in both Greek and English). (<http://ucy.ac.cy/erc/en/publications/economic-policy-analysis-papers>)

(iii) Bulletins

"Business and Consumer Surveys". The monthly bulletin "Business and Consumer Surveys" presents the main results of Business and Consumer Surveys conducted in Cyprus. The bulletin discusses short-run changes in the business climate (Services, Retail Trade, Construction, Industry) as well as recent trends in consumers' perceptions and expectations about the financial condition of their households and the economy in general. The full text is available in Greek. The bulletin also provides the main results of the Surveys in English. (<http://ucy.ac.cy/erc/en/publications/bus-cons-surveys>)

"Economic Outlook". CypERC has been publishing "Economic Outlook" on a quarterly basis since 2012. The bulletin presents short-term model-based forecasts for GDP growth and inflation in Cyprus. The outlook is discussed together with the recent economic developments as well as with challenges and prospects of the Cyprus economy. The full text is available in English. The bulletin also provides a summary of the key points in Greek.

(<http://ucy.ac.cy/erc/en/publications/economic-outlook>)

"Productivity Analysis". The bulletin presents labour productivity and total factor productivity indices for the Cyprus economy at the aggregate level as well as for sectors of economic activity. Furthermore, the bulletin presents comparisons between total factor and labour productivity and across sectors of the economy as well as cross-country comparisons, and offers policy recommendations for improving productivity. The bulletin is published on a regular basis according to data availability. The full text is available in English. The bulletin also provides an abstract in Greek with the main results. (<http://ucy.ac.cy/erc/en/publications/productivity-analysis>)

(iv) Newsletter

CypERC's Newsletter summarises research findings in a non-technical language and refers interested readers to the relevant Economic Policy/Analysis Papers and articles in the Cyprus Economic Policy Review. The Newsletter also informs readers about recent developments at CypERC and the Department of Economics of the University of Cyprus. CypERC's Newsletter is published biannually (March and October) in Greek accompanied by a summary in English. <http://ucy.ac.cy/erc/en/publications/newsletter>

Articles in the media. In 2018, the material published in the bulletins of CypERC was widely covered by newspapers and new websites in Cyprus. Cypriot newspapers and websites were extensively reported CypERC publications.

Presentations

- "Labour Market Entry, Exit and the Duration of Working Life in Cyprus: Evidence from the SHARE data", Conference on Fiscal Policies and Debt Sustainability, September 2018, Nicosia, Cyprus.
- Predicting the VIX and the VRP: The role of credit market risk", The 71st European Summer Meeting of the Econometric Society (ESEM) University of, August 27-31, 2018, Cologne, Germany.
- "Social Subsidies and Marketization – the Role of Gender and Skill", The 71st European Summer Meeting of the Econometric Society (ESEM) University of, August 27-31, 2018, Cologne, Germany.

I.1.4 Participation in workshops / meetings / working groups

- Participation in "Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 8 Preparation Meeting", 7-9 February 2018, Malta.
- Participation in "Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 8 Pretest Train-the-Trainer Meeting", 4-6 June 2018, Munich, Germany.
- Participation in "Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 8 Post-Pretest Meeting", 5-7 September 2018, Riga, Latvia.
- Participation in "2018 EUROMOD annual meeting and research workshop", 17-19 September 2018, Vienna, Austria.
- Participation in the EU Workshop on Business and Consumer Surveys organised by the European Commission, 15-16 November 2018, Brussels, Belgium.

I.1.5 Conferences

Conference in memory of Professor Panos Pashardes

On 11 September 2018, the Economics Research Centre and the Department of Economics of the University of Cyprus organised a small academic conference in memory of Professor Panos Pashardes. Professor Pashardes joined the newly established University of Cyprus in 1992 and had a pivotal role in the University's early development. He was one of the first faculty members of the Department of Economics and its first chairman. In that capacity he was instrumental in shaping the department's identity as a research-focused, internationally oriented unit. He was also very interested in applying economic research methods to important policy questions. To that end, in 2001 he founded the Economics Research Centre, which was the first research centre at the University of Cyprus. He was the Centre's director until his retirement in 2016.

EUROEMP conference

The EUROEMP conference, organized under the European Research Council-funded program "Employment in Europe" 2018 took place on 30 May - 01 June 2018. The conference was held at the Grecian Park Hotel, in the coastal area of Famagusta region of Cyprus. This was an invitation-only conference that brought together distinguished academics and economists from all over Europe and abroad, focusing on the issue of technology and jobs with emphasis on Europe, as well as other related labour market issues. Presentations specifically spanned into four thematic sessions: Skill-biased technology and heterogeneity, job loss and occupational change, employment policy and policy reform. This was the second conference organized under the EUROEMP Program; in 2016 another conference was held in Cyprus, focusing on Labour Market Policy, Gender and Immigration related issues. The EUROEMP program was granted in 2013 to Professor Sir Christoforos Pissarides and is hosted by the University of Cyprus. The official website of the EUROEMP conference 2018 can be found at: <https://ucy.ac.cy/euroemp>

I.1.6 Collaborations

Since 2017, CypERC acts as a Partner Institute of the IMD World Competitiveness Center for the annual edition of the IMD World Competitiveness Yearbook, CypERC contributes via the collection of the necessary hard data for Cyprus, i.e. about 60 indicators that cover economic performance, government efficiency, business efficiency, infrastructure and digitalization. CypERC is also responsible for disseminating the results in Cyprus via a Bulletin. More details can be found in the following address: <http://ucy.ac.cy/erc/en/collaborations>.

I.1.7 Social contribution

- Researchers (e.g. academics, students, analysts) studying issues relating to the Cypriot economy are often approach CypERC asking for information, data and studies on the Cypriot economy.
- Journalists, government officials and representatives of organized groups communicate with the Centre in order to obtain further information on the Centre's published research findings.
- The academic staff of the Centre:
 - Provide data to students of the Department of Economics of the University of Cyprus in order to conduct studies on the Cypriot economy.
 - Participate in meetings with policy makers and other private or public organizations to discuss issues relating to the Cypriot economy or topics concerning the formulation of economic policies.

- Participate in SHARE-ERIC, the European Research Infrastructure Consortium (ERIC), for the creation and operation of research infrastructures in Europe.

I.2 Research activities

CypERC produces rigorous analysis on issues of the Cypriot economy using novel and state-of-the-art techniques, building on the in-depth institutional knowledge of the local economy acquired at the Centre. Research activities focus on both microeconomic and macroeconomic topics, as well as on other specialized topics. This section of the report provides summaries of the research work conducted at CypERC in 2018 together with the names of people involved in the work.

I.2.1 Measuring the temporary-permanent wage gap in Cyprus

Christos Koutsampelas

The aim of the study is to analyse the wage gap between permanent and temporary workers in Cyprus. The use of 2009 and 2015 EU-SILC allows to get a first glimpse of the impact of recession on non-standard forms of employment. The size of the hourly unconditional wage gap is primarily sensitive to sample definitions and secondly to selection-correction procedures. Still, Cyprus can be classified among the countries with relatively high permanent-temporary gap, with the crisis having a rather marginal impact on the observed gap. The Oaxaca-Ransom decomposition technique has been deployed to decompose the wage gap into explained and unexplained components; and the latter into permanent employees' advantage and temporary employees' disadvantage. In all cases, the decomposition shows that almost half of the gap cannot be explained by productive characteristics and job attributes available in the data set. While, the unexplained component, whose absolute size is high but its relative size is close to European average, is driven by temporary employees' disadvantage. The study does not control for potential endogeneity in the form of contract-selection bias due to the absence of appropriate instruments. Still, the sheer magnitude of the wage gap and the unexplained component, alongside with other direct and indirect evidence, makes the case of wage discrimination as very plausible. The essay closes with a short discussion on relevant policies.

Koutsampelas Chr., "Measuring the permanent-temporary wage gap in Cyprus", Economic Analysis Paper No. 02-18, Economics Research Centre, University of Cyprus, June 2018.

I.2.2 The impact of austerity measures on the public -private sector wage gap in Europe

Maria Michael and Louis N. Christofides

Considering the year prior to the international and sovereign crises (2007) as a benchmark and studying all years until the crises receded in most of the 31 European countries (2013), we use the EU SILC dataset to examine the impact of public sector pay reforms on the public-private sector pay gap; we do so at the mean and along quantiles of the wage distributions, using decomposition methods to identify the explained and unexplained components of the gap. We study and code the measures taken in the 31 countries into the categorical variables Freeze and Cut and consider their impact on quantile features of the public-private pay gap using static and dynamic panel methods. Our estimates suggest that public sector freezes and/or cuts had negative and statistically significant impacts on the unexplained public-private sector pay gap,

particularly evident at the median and the 90th quantile. At the 10th quantile, the impact of the measures was positive but statistically weaker. The 90th minus 10th quantile effects are negative, reflecting attempts by many countries to protect the low-paid, regardless of the initial public-private pay gap for this group. Countries which received external financial assistance had high pay gaps before the crises and displayed a variety of adjustments during the crises. Our findings are robust to definitions of the pay gap other than the unexpected one, to estimation based on a balanced panel and to the panel method used. They should aid in the formation of wage policies pertinent to public sector employees.

Michael M. and L. N. Christofides, "The impact of austerity measures on the public-private sector wage gap in Europe", Economic Analysis Paper No. 04-18, Economics Research Centre, University of Cyprus, November 2018.

I.2.3 Aspects of the social protection system in Cyprus: A process evaluation

Louis N. Christofides and Christos Koutsampelas

This study reviews the Social Protection System (SPS) in Cyprus, as well as the amounts spent per annum, in total and for each of the various functions it supports. We delve further into the functions and policies that most immediately relate to the labour market, paying particular attention to the support of the unemployed, those in financial need, and those who are sick, and temporarily or permanently incapacitated. Important recent reforms are examined in depth, especially the Guaranteed Minimum Income programme and its connection with the pre-existing system of unemployment insurance. Lacking access to publicly available micro data on the use of various facets of the SPS, we raise questions about aspects of the system which may be modified to help ensure its sustainability, effectiveness and fairness.

Christofides N. L. and Chr. Koutsampelas, "Aspects of the social protection system in Cyprus: A process evaluation", Economic Analysis Paper No. 07-18, Economics Research Centre, University of Cyprus, December 2018.

I.2.4 Evaluating the impact of Active Labour Market Policies in Cyprus

Louis N. Christofides and Alexandros Polycarpou

The Economics Research Centre (CypERC), in collaboration with the Ministry of Finance and the Ministry of Labour, Welfare and Social Insurance, has undertaken a study to assess the provisions and potential impacts of Active Labour Market Policies (ALMP) in Cyprus, as well as the aspects of Guaranteed Minimum Income scheme that contain ALMP. A brief review of the techniques of evaluating ALMPs has been carried out focusing on Impact Evaluation which represents a more recent and relatively rigorous evaluation technique of labour market policies, used by both academics and policy makers. Based on the finding of the review, quasi-experimental techniques and in particular regression methods adjusted for observables and unobservables, as well as instrumental variable techniques could be applied to evaluate specific ALMPs in Cyprus, given data availability. The application of the aforementioned ALMP Impact Evaluation approaches will face various challenges such as (i) the construction of the relevant database (ii) the specification of the counterfactual/control group (iii) the robustness of the empirical results to model specifications and (iv) the choice of instruments, among others.

Polycarpou A. "Evaluating the impact of Active Labour Market Policies: A brief review of the recent techniques", Internal Report, August 2018. (A summary in Greek is available in: the CypERC Newsletter Issue 37, October 2018).

I.2.5 The unified database of Household Budget Surveys

Alexandros Polycarpou

The objective of this paper is the unification of the data contained in the six Household Budget Surveys (HBS) into one common database. The Surveys are conducted by the Statistical Service of Cyprus (CYSTAT) and were carried out during the years 1984/85, 1990/91, 1996/97, 2003, 2009 and 2015/16. These six surveys are more comprehensive in comparison with the ones conducted in previous years with respect to both the coverage and the objective. This was due to the increased demand of the policy makers for more detailed information concerning the socioeconomic conditions on the island.

The unified database consists of six different datasets each one containing different qualitative and quantitative variables. The dataset named ALLPERSONS contains variables concerning personal characteristics of the individuals of the household. These variables include, among others, age, sex, marital status, education level, economic activity, and area of residence. The ALLINCOME dataset includes variables relating to the income of the household members from employment and other sources such as property, non-salaried activities, and benefits. The ALLINCOMEH dataset contains income variables which are available only at household level. The dataset with the name ALLEXPENDITURE contains variables concerning the expenditure of the household on groups of durable and non-durable goods and services. Finally the ALLHHOLDS dataset includes variables relating to some specific characteristics of the household premises.

Polycarpou A., "The unified database of Household Budget Surveys 1984/85, 1990/91, 1996/97, 2003, 2009 and 2015/16", Economic Analysis Paper No. 06-18, Economics Research Centre, University of Cyprus, December 2018.

I.2.6 Forecasting economic activity in sectors of the Cypriot economy

Nicoletta Pashourtidou, Christos Papamichael and Charalampos Karagiannakis

The aim of this study is to apply single equation dynamic models together with information from a large dataset of predictors in the construction of short-term growth forecasts for the production-side components of the national accounts, i.e. Gross Value Added of sectors, and import duties plus Value Added Tax. To summarise the information content in a large number of predictors, we employ techniques such as common factors and forecast combinations. Aggregate and component forecasts are computed under two approaches to forecasting GDP growth, namely a direct and a bottom-up approach. In the direct approach, unconstrained models for GDP growth are estimated to compute forecasts for the aggregate, while constrained component models are used to obtain the disaggregate forecasts, which add up to the GDP growth forecasts computed directly. In the bottom-up approach, unconstrained component models are estimated to compute growth forecasts for the components as well as for GDP growth by adding up the unconstrained component forecasts. The performance of aggregate and disaggregate forecasts from the two approaches is assessed via pseudo out-of-sample exercises. The results show that the use of macroeconomic and financial predictors improves on the accuracy of the naïve forecasts for most production-side components and the aggregate, under both the direct and

bottom-up approaches. GDP growth forecasts from the direct approach are somewhat superior to those from the bottom-up approach. Both approaches result in gains in forecasting growth in industry, construction, trade, financial activities and duties. In the sector of professional services gains are limited for both constrained and unconstrained forecasts. In the sectors of agriculture and public administration, education and health, neither the unconstrained models nor the constrained sectoral models significantly improve on the naïve benchmark. Compared to the unconstrained component forecasts, gains attained through constrained forecasts are slightly lower, but more widespread across components and horizons.

Pashourtidou N., Papamichael Ch. and Ch. Karagiannakis, "Forecasting economic activity in sectors of the Cypriot economy ", Cyprus Economic Policy Review Journal, Volume 12, Number 2, December 2018.

I.2.7 Forecasting economic activity in sectors of the Cypriot economy using VAR models

Nicoletta Pashourtidou and Christos Papamichael

This study explores the use of Vector Autoregressions (VARs) for the construction of short-term growth forecasts for the production-side components of GDP as well as for GDP growth via aggregation of its component forecasts. The production-side components of GDP are given by the gross value added in six sectors of economic activity (i.e. agriculture, industry, construction, trade and transport, financial and business activities, and other services), and import duties plus value added tax. Apart from simple VARs, we also consider VAR models augmented with exogenous variables represented by common factors. The common factors are computed from separate blocks of series in the dataset so that the resulting factors represent different aspects of the economy.

The results show that, in general, component forecasts obtained from VARs with exogenous factors outperform simple VAR forecasts. Forecast gains, however, are mainly attained for short horizons. The exceptions are the construction sector in which some gains are found for longer horizons, and the sector of financial and business activities in which significant gains are attained for both short and long horizons. Component forecasts computed from single equations are at least as accurate as VAR forecasts. However, the contraction in real activity during the period 2012 – 2013 was better predicted by VAR models in the case of large components such as trade, financial and business activities, and other services. Similarly, bottom-up GDP growth forecasts from single equation models for components are at least as precise as indirect forecasts using VARs to compute the component forecasts. Direct GDP growth forecasts are the best performers over the period examined.

Pashourtidou N. and Chr. Papamichael, "Forecasting economic activity in sectors of the Cypriot economy using VAR models", Economic Analysis Paper No. 01-18, Economics Research Centre, University of Cyprus, April 2018. (A summary in Greek is available in: the CypERC Newsletter Issue 37, October 2018).

I.2.8 Residential property price indices using asking prices

Sofia N. Andreou and Nicoletta Pashourtidou

This paper uses micro data on property advertisements published in widely circulated newspapers and on the website of a large real estate agency to construct residential price indices

for Cyprus. The sample covers the period from 2000Q1 to 2018Q2 and contains information on various property characteristics (e.g. property type, size, location). A regression model is estimated using rolling samples of 12, 20 and 40 quarters. We obtain six sub-aggregate price indices i.e. for houses and flats located in the districts of Nicosia, Limassol, and in the remaining districts. Using the six sub-aggregate indices, we construct five aggregate price indices, i.e. for (i) houses, (ii) flats, (iii) Nicosia, (iv) Limassol, (v) other districts, as well as an overall property price index for Cyprus. The estimated price indices are juxtaposed with other available property price indices in Cyprus, namely the indices published by the Central Bank, Eurostat and RICS, as well as with a number of macroeconomic indicators relating to the property market. We find that the estimated property price indices are not particularly sensitive to the choice of the rolling window size, but some type of smoothing is required to reduce the dominance of the irregular factor over the regular (trend-cycle) component. The resulting indices are significantly correlated with the corresponding property price indices published by other organisations, and their agreement in the direction of quarterly changes is high. Overall, the indices constructed in this paper tend to be associated with slightly larger quarterly percentage changes (higher growth and smaller contraction), on average, compared to similar indices over common periods. The estimated indices are highly correlated with a number of macroeconomic variables (e.g. the growth rate of GDP, construction investment, value added in construction, housing loans). Moreover, the estimated indices are found to contain some leading information vis-à-vis other property price indices in the case of flats and the district of Limassol. For the rest of the districts and in the case of the overall index, we find evidence of bi-directional causality between the estimated indices and the corresponding indices of the Central Bank.

The properties of the proposed indices together with their timely nature in terms of data availability could make them a useful tool for monitoring the evolution of property prices as well as macroeconomic developments in Cyprus.

Andreou S. N. and N. Pashourtidou, "Residential property price indices using asking prices", Economic Policy Paper, forthcoming

12.9 Uncertainty and economic activity: Evidence from a panel of euro area countries

Elena Andreou and Christiana Anaxagorou

The aim of this study is to examine the impact of uncertainty on economic activity using a measure of uncertainty based on European survey data. The importance of uncertainty and the effect it has on consumer and firm behaviour has been highlighted in the literature, particularly in the face of the recent financial crisis. This paper constructs an uncertainty measure based on the European Commission Business and Consumer Surveys (BCS) as proposed by Girardi and Reuter (2017) and Bachmann et al. (2013). This measure considers the dispersion of the forecast errors of the responses of economic agents on various questions of the BCS for consumers and for businesses in the sectors of industry, services, retail trade and construction. The studies in the literature focus on a time-series analysis of the euro area (Girardi and Reuter, 2017), or for specific countries (Bachmann et al., 2013). This paper focuses on a panel analysis of the old members of the euro area with available data since 1999 to enable us to identify the heterogeneous effect of uncertainty shocks across these different member countries as the impact on economic activity

or the duration of the shock may vary from country to country based on their different characteristics. This is an on-going project.

I.2.10 Determinants of non-performing loans in Cyprus: A Bayesian VAR approach

Nektarios A. Michail and Christos S. Savva

The study investigates the macroeconomic determinants of non-performing loans in Cyprus, using a Bayesian VAR methodology, employing a disaggregate approach by using Household and Non-Financial Corporation (NFC) NPLs in order to reach more precise estimates. Overall, the results suggest that the determinants of NPLs vary across the two sectors, with only industrial production having a negative effect on both. Funding conditions, i.e. deposits, have been found to have an effect on both household and NFC NPLs, albeit likely through different channels. Other important factors also exist, although these are different across the two sectors. Forward-looking variables, like the ESI, do not appear to register any important effects on NPLs. The findings bear policy implications, with the most important being that growth has to be persistent if a decrease in the overall level of NPLs is to be observed.

Michail A. N. and Chr. S. Savva, "Determinants of non-performing loans in Cyprus: A Bayesian VAR approach", Economic Analysis Paper No. 03-18, Economics Research Centre, University of Cyprus, October 2018.

I.2.11 On the cost-effectiveness of national economy-wide greenhouse gas emissions abatement measures

Chryso Sotiriou, Apostolos Michopoulos and Theodoros Zachariadis

This study explores cost-effective greenhouse gas abatement options for the European Union Member State of Cyprus, for those sectors of the national economy that are not subject to the region's Emissions Trading System. The analysis leads to the construction of a baseline and several alternative marginal emission abatement cost curves. It addresses all economic sectors and considers all different types of mitigation measures – improving energy efficiency, switching to low- or zero-carbon fuels, and inducing behavioural changes. We apply nationally appropriate data that are mainly derived from local market information and judgement of national experts. Finally, we present results of several sensitivity analyses, which address main shortcomings of marginal abatement cost curves that have been identified in the literature, and discuss the policy implications of each one of them. Apart from its relevance for EU Member States, this assessment is useful for all countries seeking guidance in their decarbonisation strategies.

Sotiriou Chr., A. Michopoulos and Th. Zachariadis, "On the Cost-Effectiveness of National Economy-Wide Greenhouse Gas Emissions Abatement Measures", Economic Analysis Paper No. 05-18, Economics Research Centre, University of Cyprus, November 2018.

I.2.12 Survey of Health, Ageing, and Retirement in Europe (SHARE)

Nicos Theodoropoulos and Alexandros Polycarpou

CypERC participates in the SHARE-ERIC network for the last three years. The aim of the SHARE is to collect longitudinal, cross-country, and multidimensional microdata for individuals aged 50 and older in order to analyze the process of population ageing in depth. Ass. Prof. Nikos Theodoropoulos (Country Team Leader, CTL) and Alexandros Polycarpou (Country Team Operator, CTO) composed the Cypriot SHARE since its inception.

Between January and May 2018, the national country team worked towards finalizing wave 7 but also preparing wave 8 of the survey. The final data collected in wave 7 in Cyprus were checked and cleaned using the templates and manuals provided by SHARE Central. In addition, the remarks made by the interviewers during the interviews were translated and coded in order to improve the quality of the data. Finally, country specific variables were coded and harmonized between countries. Also, a chapter in the Methodology Volume for wave 7 was written by the Cyprus SHARE team describing their experience as a SHARE new country. For wave 8, during the first half of 2018, the procurement process of acquiring a survey agency was finalized. Further, after a series of presentations toward interested ministries about the usefulness of SHARE data for policymaking and for academic research, the Ministry of Finance granted national co-funding. Moreover, the translation in Greek of the generic (English) version of the survey material was carried out. After the translation of the pre-test questionnaire the national CAPI was prepared by CentERdata and was tested, by the national team, for bugs related to language, missing response options, routing problems and technical issues. After three rounds of instrument testing, solving of problems and generating a new national instrument, a stable and good version of the national CAPI was obtained and used during the pre-test.

After May 2018, the national team was working entirely on wave 8 of SHARE. The CTO with two members of the survey agency participated in the Train-the Trainee (TTT) meeting in Munich and after that the survey agency organized a national training session (NTS) for the interviewers in Cyprus in which the CTO also participated. The data collection for the pretest in Cyprus took place in July where about 60 individuals were interviewed. The national country team communicated twice during the pretest data collection period in order to be informed about the fieldwork progress and performed quality controls on the collected pretest data. Based on the results from the pretest, and after the post-pretest SHARE meeting, wave 8 generic questionnaire was reviewed and the wording of some questions needed to change. A new round of translation was performed on the new items of the questionnaire and in December a new national instrument was prepared by CentERdata and was tested for bugs by the national team. A number of routing problems and technical issues were identified especially when the instrument is run on the survey agency's tablets. The CentERdata is working on solving these problems and a new version of the national instrument is expected in February 2019.

During 2018, the national SHARE team participated in the SHARE Wave 8 Preparation Meeting in Malta from 7-9 February 2018, in the Pretest TTT for SHARE Wave 8 in Munich on 4-6 June 2018, and in the SHARE Wave 8 Post-Pretest Meeting in Riga, Latvia from 5-7 September 2018.

The members of the Cypriot SHARE team have also started working on a policy paper studying the "Labour Market Entry, Exit, and the Duration of Working Life in Cyprus" using data for Cyprus from the wave 7 SHARE dataset. Alexandros Polycarpou presented in September 2018 some first results from the paper at a conference on "Fiscal Policies and Debt Sustainability" organized by the Cyprus Economic Society in Nicosia.

More information on the SHARE project can be found at <http://www.share-project.org>

I.2.13 Tax-benefit microsimulation model for the European Union- EUROMOD

Panayiota Lyssiotou and Alexandros Polycarpou

CypERC participated for the 8th year in the EUROMOD cooperation network. Associate Prof. Panayiota Lyssiotou (coordinator), Christos Koutsampelas and Alexandros Polycarpou, composed the Cypriot EUROMOD team in 2018. The national team has prepared the country specific program files and generated the EUROMOD input data, provided uprating indexes for updating the momentary figures of the dataset, collected all the policy rules of the tax and benefit system in Cyprus and collected external statistics for use in the macro validation of the model. The national team also produced the EUROMOD country report for Cyprus. The report includes: a) a description of the EUROMOD input data and the adjustments made to the original EUSILC data, b) a documentation of the uprating factors, c) an overview of the Cypriot tax-benefit system, d) a description of the modelled tax-benefit instruments, and e) a macro validation of the output of the model in relation to external statistics.

Associate. Prof. Panayiota Lyssiotou and Alexandros Polycarpou participated in the 2018 EUROMOD annual meeting in Vienna on 18-19 of September 2018. There they had the opportunity to exchange views on how to improve and promote the use of the model and they were informed by the development team in Essex about changes to the model software, opportunities for model expansion and financing, and other issues related to the maintenance, updating and operation of the model. They were also briefed on the evolution of the process of transferring the management, maintenance, development and updating of the model from the Microsimulation Unit of the Institute for Social and Economic Research, University of Essex to the Joint Research Center (JRC) of the European Commission.

EUROMOD: Country Report. CYPRUS 2015-2018, Institute for Social and Economic Research, University of Essex, November 2018. Available at:

https://www.euromod.ac.uk/sites/default/files/country-reports/year8/Y8_CR_CY_Final.pdf

I.2.14 Productivity developments in Cyprus

Theofanis Mamuneas and Charalampos Karagiannakis

Strong productivity growth is a prerequisite for sustainable economic growth, which in turn translates to increases in the standard of living. It further ensures national competitiveness, contributing to favourable current account dynamics. Using multifactor analysis allows us to examine the underlying forces that contribute to labor productivity changes. Changes in labor productivity over time reflect movements in multifactor productivity –and therefore efficiency of resources’ utilization, and in the relative intensity of the use of the various factors of production. Increases in multifactor productivity translate to higher output with the same amount of inputs (capital and labor), hence increased efficiency in production processes.

Since 2015 that the Cypriot economy has enjoyed strong economic growth, productivity growth has rebounded, but the economy’s rate at which output per hour worked has increased, is yet to reach the pre-crisis levels. More efficient usage of the country’s resources, as captured by the soar in multifactor productivity over the latest years, has been the primary driver of this increase in labor productivity. The increase reflects past and recent efforts aiming at privatization of state owned companies, removing barriers and introducing greater flexibility in the labor market, and reforming the public sector to minimize wasteful bureaucracy, among others. Nevertheless, the

tepid labor productivity growth of the Cypriot economy is an outcome of the decline in the growth of capital intensity, or the rate of change in capital stock per employed labor. Since labor productivity rises when capital grows faster than labor (if no changes in the efficiency of input factors occur), the observed slowdown in labor productivity is due to the fact that over the period since the end of 2014, capital has grown at a significantly slower pace than labor. With a significant amount of non-performing exposures still in Cypriot banks' balance sheets, and tighter regulations in place for new credit lines, corporations find it harder to finance the acquisition of new fixed assets, which contributes to the negative substitution effect observed in the economy, and at the same time hinders the potential expansion of productive firms, compromising productivity.

Earlier releases of this commentary, that included cross country comparisons of multifactor productivity among European countries, highlighted the need for Cyprus to find ways to increase its productivity in order to improve its relative position in comparison to advanced European countries. To the path towards higher productivity growth, policies that target on increasing economic efficiency are of utmost importance. Following the international literature on the factors that drive productivity growth, to boost productivity, and thus, enhance sustainable growth and competitiveness in Cyprus, policies that encourage investment in Information and Communications Technology (ICT) and human capital, and promote Research and Development (R&D) should be at the centre of political agendas. These policies, in conjunction with continuous efforts to eliminate structural rigidities (such as delays in the judicial system, and wasteful administrative procedures within the public sector) and improve the soundness of economic institutions, including a healthier banking sector and/or the development of alternative sources of financing that can satisfy the needs of enterprises to fund their investments, will lead to productivity increases, assisting Cyprus to catching-up with the West Central European countries.

Productivity Analysis Bulletin, Issue 18/1, December 2018. Available at: <http://ucy.ac.cy/erc/en/publications/productivity-analysis>

I.2.15 Competitiveness rankings for Cyprus

Nicoletta Pashourtidou and Sofia N. Andreou

CypERC acts as a Partner Institute of the IMD World Competitiveness Center for the 2018 edition of the IMD World Competitiveness Yearbook by contributing to the collection of the necessary data for Cyprus as well as by disseminating the results for Cyprus via a Bulletin. In the 2018 IMD World Competitiveness Ranking, Cyprus ranked 41st in a group of 63 countries. In 2018, Cyprus dropped four places compared to the 2017 ranking. The decline in Cyprus's position resulted from lower rankings with respect to the factors of government efficiency, business efficiency and infrastructure. In 2018, Cyprus's ranking with respect to economic performance improved considerably. In the 2018 IMD World Digital Competitiveness Ranking, Cyprus ranked 54th among 63 countries, dropping one place compared to the 2017 ranking. The decline in Cyprus's digital position was driven by lower rankings with respect to the factors of knowledge and technology. Nevertheless, in 2018, Cyprus's ranking with respect to the factor of future readiness showed marked improvement.

Competitiveness of the Cyprus 2018, Available at:

http://ucy.ac.cy/erc/documents/IMDWC%CE%A518_Cyprus.pdf, and in the CypERC Newsletter Issue 37, October 2018.

I.2.16 Forecasts and confidence indicators for Cyprus

Charalampos Karagiannakis, Christos Papamichael and Nicoletta Pashourtidou Among the main activities at CypERC is the systematic production and publication of the following: (i) macroeconomic forecasts, and (ii) economic confidence indicators for the Cypriot economy.

Short-term forecasts for GDP growth and inflation are constructed every quarter using state-of-the-art econometric techniques and a large database of domestic and foreign / international macroeconomic and financial indicators. The forecasts are analysed in conjunction with the recent domestic and international economic developments, and are accompanied by upside and downside risks to the outlook. The quarterly forecasting tasks run parallel to the tasks of extending and improving the macro database, the econometric models and the computer codes for estimation and forecasting.

The results of Business and Consumer Surveys conducted in Cyprus are validated and analysed on a monthly basis. Monthly confidence indicators for construction, industry, services, retail trade and consumers as well as an overall economic sentiment indicator are computed, and their short-run changes and drivers are analysed. Recent trends in firms' and consumers' perceived activity and financial condition respectively, and expectations about future activity, prices, employment / unemployment are also analysed. Capacity utilisation indices for industry and services are produced on a quarterly basis. Various aspects of firms' investment perceptions and expectations in the case of the industrial sector are analysed bi-annually, using data collected via the Investment Survey. Moreover, the CypERC staff are responsible for dealing with methodological aspects of the Surveys and provide feedback to the European Commission on methodological issues.

"Economic Outlook", Quarterly Bulletin, Issue 18/1 January 2018, 18/2 May 2018, 18/3 July 2018, 18/4 October 2018. Available at: <http://ucy.ac.cy/erc/en/publications/economic-outlook>"

Business and Consumer Surveys", Monthly Bulletin, Issue 18/1 (January 2018)-18/12 (December 2018), in Greek. Available at: <http://ucy.ac.cy/erc/el/publications/bus-cons-surveys>

Summary of key points in English available at: <http://ucy.ac.cy/erc/en/publications/bus-cons-surveys>

I.2.17 Employment in Europe

Prof. Christoforos Pissarides

Social Subsidies and Marketization – the Role of Gender and Skill¹ (by Robert Duval-Hernández, Lei Fang, L. Rachel Ngai)

This paper decomposes the differences in aggregate market hours between US and Europe across gender-skill groups and finds that low-skilled women are the biggest contributors to aggregate differences, with the exception of Nordic countries. We develop a model to account for the gender-skill differences in market hours across countries. Taxes, which reduce market hours in favor of

¹ Previously version circulated as "Taxes and Market Hours – the Role of Gender and Skill"

leisure and home production, explain a substantial fraction of the differences in hours for Southern and Central European countries. Subsidized family care, which reduces home hours of women in favor of market hours, explains the different pattern of hours in Nordic countries. Low-skilled women are more responsive to policy because of their comparative advantage in producing home services and the corresponding market substitutes.

The research results have been published as Working Paper in:

- -Centre for Macroeconomics, Discussion Paper, CFM-DP2018-04
- -SOEP papers on Multidisciplinary Panel Data Research, 962-2018
- -LSE Research Online Documents on Economics, 87181

Geographical proximity and open innovation of SMEs in Cyprus (by Chrystalla Kapetaniou and Soo Hee Lee)

Open innovation implies that geographical proximity is irrelevant. However, we posit that any potential innovation outcome depends on the spatial constraints on openness. In this paper, we add a geographical proximity dimension to open innovation by analysing how a domestic and international open innovation approach affects innovation outcomes. In particular, we hypothesise that domestic open innovation has positive effects on new-to-the-firm product innovation, due to easily accessible resources. We further posit that, through international open innovation, SMEs can access new and advanced knowledge which is not available locally, leading to more novel innovations. However, we expect that the relationship between openness, both domestic and international, and innovation is conditional on R&D activities. Our empirical analysis based on the Cyprus Community Innovation Survey supports these hypotheses. Our results underline the critical role of the spatial aspect on open innovation in SMEs, something which has remained surprisingly absent from the literature.

The research results have been published in *Small Business Economics* (ABS 3*):

Kapetaniou, C., & Lee, S. H. (2018). Geographical proximity and open innovation of SMEs in Cyprus. Small Business Economics, 1-16. DOI: <https://doi.org/10.1007/s11187-018-0023-7>

Innovation policies of Cyprus during the global economic crisis: Aligning financial institutions with National Innovation System (by Chrystalla Kapetaniou, Marios Samdanis and Soo Hee Lee)

Previous research has overlooked the complementarity between National Innovation Systems and financial institutions. This paper extends the literature on National Innovation Systems, arguing that innovation policies should incorporate the particular needs of a nation's innovation system and the current conditions of that nation's financial environment. This development is important because the financial environment is malleable and subject to exogenous events, such as the recent global financial crisis. The relationship between a National Innovation System and the financial environment is presented through an analytical framework, which can be used to assess and instigate national innovation policies. The analytical framework is demonstrated using the case of Cyprus, which was on the frontline of the European debt crisis. By integrating the views of leaders from the Cypriot manufacturing and service sectors with widely available reports and indices concerning innovation performance, we demonstrate that the lack of a developed financial environment impedes national innovation performance. This research

introduces policy and managerial implications for innovation, especially within the context of underdeveloped National Innovation Systems, which focus on improving innovation performance by enhancing the availability of financial instruments and the access that entrepreneurs have to them.

The research results have been published in *Technological Forecasting & Social Change* (ABS 3*)

Kapetaniou, C., Samdanis, M., & Lee, S. H. (2018). Innovation policies of Cyprus during the global economic crisis: Aligning financial institutions with National Innovation System. Technological Forecasting and Social Change, 133, 29-40. DOI: <https://doi.org/10.1016/j.techfore.2018.02.019>

Earnings flexibility in Spain during the Great Recession (by Paris Nearchou)

Using micro level administrative data we estimate measures of the extent of downward rigidity in annual earnings in Spain for each year between 2007-2016. Our results show the existence downward rigidity in both nominal and real terms throughout this period. A decrease in overall downward earnings rigidity during each of the two recession episodes over the Great Recession (2008-13) is attributed to the decrease in downward rigidity in real terms. Downward rigidity in nominal terms appears to be increasing throughout the observation period, however its size is considerably smaller than in real terms. The short-term impact of the 2012 labour market reforms on annual earnings flexibility appears to be minimal.

II. Research plan 2019

II.1 Business and Consumer Surveys

C. Karagiannakis and N. Pashourtidou

The Economics Research Centre (CypERC) coordinates the conduct of Business and Consumer Surveys in Cyprus which are part of the Joint Harmonised EU Programme of Business and Consumer Surveys. The Surveys collect monthly data that record business executives' and consumers' perceptions of current economic conditions and expectations about the evolution of economic variables. The results of Business and Consumer Surveys for Cyprus are sent to the European Commission on a monthly basis in a predetermined format and according to a predetermined schedule; the results are used in the computation of EU and euro area aggregates. Also, Survey results are utilised by the European Commission, other international and local organisations, such as the Central Bank and the Ministry of Finance, in their economic reports for Cyprus.

Research at the Centre deals with the analysis of Business and Consumer Survey data and the construction of confidence indicators for sectors of economic activity, consumers and the economy as a whole. The results of the analysis are published in the Bulletin "Business and Consumer Surveys" (in Greek accompanied by an English summary of the main points) every month. The Bulletin presents short-term developments in the business climate in Services, Retail Trade, Construction and Manufacturing, formed by firms' views on their recent and future economic conditions (e.g. turnover, production, order books, stocks, employment, etc.). The Bulletin also presents trends in consumer confidence shaped by consumers' opinions about the recent and future financial conditions of their households and the economy in general. The evolution of capacity utilisation in manufacturing and services is monitored on a quarterly basis by the computation of capacity utilisation indices. The results of a bi-annual Investment Survey in manufacturing, including estimates of percentage changes in (past/current/future) investment and types of investment, are published in May and November.

Apart from the monthly validation and analysis of raw and aggregate Survey data, research at the Centre deals with the systematic monitoring of the quality of Survey data for Cyprus (e.g. tracking performance of Survey variables with respect to reference series), and methodological aspects of the Surveys (e.g. updates of population weights, refinements/changes to survey questionnaires).

II.2 Macroeconomic forecasts for Cyprus

C. Papamichael and N. Pashourtidou

II.2.1 GDP growth and inflation

One of the key activities at the Centre is the construction of forecasts for GDP growth and inflation in Cyprus. The forecasts are constructed using modern econometric techniques and an extensive database of domestic and foreign/international indicators. The database of over 300 monthly and quarterly indicators is constantly updated and expanded, and the econometric techniques are regularly evaluated and modified if necessary. The forecasts are published on a quarterly basis in the Bulletin "Economic Outlook". The forecasts are analysed in conjunction with current domestic and international developments; upside and downside risks to the outlook for growth and inflation are also discussed.

II.2.2 Forecasts for activity growth in sectors of the economy

In 2018, the development and evaluation of models for the construction of forecasts for sectors of economic activity was completed. Two classes of models are considered: (i) single equation dynamic models (AR, ADL, Factor Augmented AR, Factor Augmented AR), and (ii) systems of equations, i.e. Vector Autoregressions-VAR- (simple VAR, VAR augmented with exogenous factors, Bayesian VAR).

In the first instance, forecasts for the growth rate of all the production-side components of GDP that appear in the quarterly National Accounts are computed. More specifically, the forecasts cover the Gross Value Added in 10 sectors of economic activity (agriculture; industry; construction; trade; information and communication; financial and insurance; real estate; professional and administrative services; public administration, education and health; other services) as well as net taxes on products. Aggregate and component forecasts are computed under two approaches to forecasting GDP growth, namely a direct and a bottom-up approach. In the direct approach, unconstrained models for GDP growth are estimated to compute forecasts for the aggregate, while constrained component models are used to obtain the disaggregate forecasts, which add up to the GDP growth forecasts computed directly. In the bottom-up approach, unconstrained component models are estimated to compute growth forecasts for the components as well as for GDP growth by adding up the unconstrained component forecasts.

In the second instance, the growth rates of the production-side components of GDP are jointly modelled and forecasted. Due to a large number of unknown parameters, a smaller number of GDP sub-aggregates is modelled by grouping some services sectors. Thus, forecasts are constructed for the Gross Value Added in six sectors (agriculture; industry; construction; trade; financial and business activities; other services), and for net taxes.

The analysis shows that component forecasts computed from single equation methods are at least as accurate as forecasts obtained from systems of equations. However, the contraction in real activity during the period 2012 – 2013 was better predicted by VAR models in the case of large components such as trade, financial and business activities, and other services. Bottom-up GDP growth forecasts from single equation models for components are at least as precise as GDP growth forecasts obtained by summing up VAR component forecasts. GDP growth forecasts computed directly are the best performers over the period examined.

The abovementioned methods for computing aggregate and disaggregate forecasts will be monitored and evaluated in real time by computing the forecasts on a quarterly basis. After the release of new National Accounts data, modifications or extensions to the existing models will be made if necessary. The forecasts will be available to the Centre's sponsors as from the beginning of 2019 for evaluation and their own use for a period of up to a year. Subsequently the forecasts will be made publicly available via CypERC's Bulletin "Economic Outlook".

II.3 Residential property price indices

S. Andreou and N. Pashourtidou

This project deals with the development and systematic update of a database of property advertisements collected from newspapers of wide circulation in Cyprus and websites of large real estate agencies. Prices along with property characteristics (district, type of property, number of bedrooms, property size in square metres, etc.) are collected monthly, spanning a period from 2000

to 2018.² The database contains five types of properties: (i) four-bedroom houses, (ii) houses with up to three bedrooms, (iii) studios and one-bedroom flats (iv) two-bedroom flats and (v) three-bedroom flats, covering the districts of Nicosia, Limassol, Larnaca, Famagusta and Paphos. Over a given quarter, 288 observations on residential properties are sampled using stratified random sampling, with the districts and property types as the strata. The aim of the project is the construction of residential property price indices of quarterly frequency using econometric techniques, for monitoring property market and macroeconomic developments.

Price indices for each property type in each district can be estimated using an econometric regression model. For modelling purposes, we consider two property types (houses and flats) and three districts (Nicosia, Limassol, and collectively Larnaca, Famagusta and Paphos), thus obtaining six sub-aggregate indices. The sub-aggregate indices are aggregated to estimate type-specific and district-specific indices as well as an overall residential property price index for Cyprus. In the aggregation process the weights that are representative of the population and are used in sample selection are applied. The estimation of sub-aggregate indices provides information on the key drivers (types, districts) of the developments observed in the domestic property market. As the estimated indices are model-based, the statistical significance of their quarterly change can be computed, thus providing a reliability measure of the estimated change. The model is estimated using rolling windows to take into account structural breaks in the parameters. Alternative sizes (small, medium, large) of rolling windows are considered and the statistical properties of the resulting indices are examined. Moreover, the properties of the estimated indices are investigated vis-à-vis other available property price indices (Central Bank, Eurostat, RICS) and macroeconomic indicators.

The residential property price indices will be estimated every quarter and their evolution will be monitored in conjunction with developments in published property price indices and short-term macroeconomic series. Modifications to the data collection process, the modelling and/or estimation methods will be made if deemed necessary. The estimated property price indices will be available to the Centre's sponsors as from the second quarter of 2019. The release of a quarterly bulletin that will present the type-specific (houses, flats) and district-specific (Nicosia, Limassol, other districts) indices, as well as the overall residential property price index for Cyprus, is planned by the final quarter of 2019.

II.4 Uncertainty indicators

E. Andreou, C. Anaxagorou and N. Pashourtidou

The recent financial crisis has created an interest in defining and measuring economic uncertainty but also in assessing the impact of uncertainty on economic activity, employment and other economic variables. As uncertainty is not directly observed, empirical analysis is undertaken using various measures based on different data sources such as: an index of stock market volatility, individual business data (sales, profits), sectoral productivity data, dispersions in forecasts by professional forecasters, micro and/or macro data from Business and Consumer Surveys and indicators based on newspaper articles and the frequency of words relating to uncertainty (Girardi and Reuter, 2017; Baker et al., 2016; Bloom, 2014; Bachmann et al., 2013). Additionally, another approach proposed by Jurado et al. (2015) defines and estimates macroeconomic uncertainty as

² Advertisements for plots are also collected; the data could be used in the estimation of land price indices.

the conditional volatility of the forecasting error with forecasts constructed using common factors from large datasets of macroeconomic and financial series. The studies mentioned focus mostly on cross-sectional variation or cases of individual countries.

There is a strong research interest in the production of uncertainty indicators using data from the European Commission Business and Consumer Surveys (BCS). Several institutions producing BCS data are conducting research on the construction of uncertainty indicators (for example, the European Commission, Ifo in Germany, ISTAT in Italy and WIFO in Austria). At the same time, there is a strong interest in the international literature on the impact of uncertainty both by academics and by policy makers such as the European Central Bank. The BCS dataset offers information on the assessments of consumers and firms in different sectors (industry, services, retail trade and construction) regarding, among other things, their perceived and expected financial conditions.

As a first step, the aim of this project is to examine alternative methods for estimating uncertainty indices for the Cypriot economy as well as for other European countries that are of importance to Cyprus, using the BCS data. More specifically, we aim to use aggregate percentages of optimistic and pessimistic responses of both businesses and consumers, following the techniques adopted by Girardi and Reuter (2017). Girardi and Reuter (2017) extend the methodology of Bachmann et al. (2013), who focus on the industry sector for the cases of Germany and the US, and estimate uncertainty for the whole economy (businesses and consumers). For the case of Cyprus, the aggregate measure for the whole economy is more applicable since industrial production is not the main driver of the economy. Based on the aggregate measure, various macroeconomic aspects can be investigated, such as prices, aggregate production or aggregate consumption.

As a second step, the project will focus on the use of the constructed uncertainty indices in econometric models to assess the ability of uncertainty indicators to predict changes in economic aggregates. These indicators will then be used in the context of macroeconomic models for economic policy analysis. The identification of such models will primarily aim at investigating the dynamic relationship of uncertainty and macroeconomic variables, and assessing the impact of uncertainty (size and duration) on variables such as economic activity, employment (sectors and economy), consumption and investment. A panel VAR setting for various countries in the euro area that impact the Cypriot economy will be used, allowing a comparison between several European countries and the euro area as a whole. The estimation of a panel VAR will allow us to assess the size and duration of uncertainty changes in different countries and identify any differences between them as the responses may vary from country to country. Nevertheless, this indicator is based on disagreement of forward-looking questions and they may capture heterogeneous expectations between firms or consumers or differences in their information sets.

For this reason, at a later stage, alternative measures of uncertainty will be examined. For example, the individual (micro) firm responses and the panel nature of the survey data can be exploited to estimate alternative uncertainty indicators, following Bachmann et al. (2013). The expectations of firms in the panel for a three-month horizon, covering different aspects of their business (e.g. turnover, production, order books, employment), can be compared with realisations reported by the same firms three months later. This comparison allows the calculation of ex post forecast errors. Uncertainty measures can be constructed by computing the standard deviation of firms' (cross-sectional) forecast errors. These measures can be constructed for different sectors or for the economy as a whole, by applying population weights to individual forecast errors.

One of the objectives of the research project is the systematic construction of uncertainty indicators for the Cypriot economy and its sectors, and the publication of these indicators in the Centre's bulletins. Such indicators conveying timely information on the level of uncertainty can be used by policy makers or by business and investors. The literature on uncertainty has established that changes in uncertainty lead to economic fluctuations and as the recent financial crisis showed, high levels of uncertainty prolong periods of economic downturn (van Aarle and Moons, 2017). Furthermore, examining a panel of countries can allow us to compare the responses of each country to a shock and identify the heterogeneous characteristics that determine the responses of different countries to uncertainty shocks.

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II.5 The shadow economy in Cyprus

E. Andreou, A. Polycarpou and G. Syrighas

The shadow economy is known under different names such as black, hidden or informal economy and it is by nature difficult to estimate. Notwithstanding this difficulty, approximation of the size and development of the shadow economy lies at the heart of estimating the extent of tax evasion and designing appropriate policies of combating it. In the relevant literature different definitions of what constitute a shadow economy were used and various methods have been employed to come up with an estimate of the shadow. For the purposes of the study at hand the most suitable definition is the one that refers to activities which are hidden from the authorities and therefore neither are taxed nor are included in national statistics. As regard the methods used for the estimation of the shadow economy can be classified into two major strands:

- (a) Direct or micro approaches which include the National Accounts approach (Gyomai and Ven 2014, Snheider 2017), Representative Surveys (Feld and Larsen 2005, 2008, 2009, Zukauskas and Schneider 2016), and Surveys of company managers (Putnins and Sauka 2015, Reily and Krstic 2017).
- (b) Indirect or Macro Approaches which cover the Discrepancy between national expenditure and income statistics (MacAfee 1980, Yoo and Hyum 1998), Discrepancy between official and actual labour force (Contini 1981, Del Boca 1981, and O'Neil 1983), Electricity approach (Kaufmann and Kaliberda 1996, Del Borga and Forte 1982, Portes 1996, and Jonson et al.

1997), Transaction approach (Feige 1979, Boeschoten and Face 1984 and Langfeldt 1984), Currency demand approach (Schneider 2010, Vuletin 2008, Williams and Schneider 2016), Multiple Indicators-Multiple Causes model (MIMIC) (Frey and et al. 1984, Schneider et al. 2010, Hassan et al. 2016 and Buehn et al 2009).

Over the years a number of studies have also tried to estimate the shadow economy in Cyprus. Specifically, Pashardes and Polycarpou (2008) used the micro household approach to uncover the extent to which Cypriot households underreport their income and which sources of income (e.g. self-employment, capital income, agriculture etc.) are more responsible for tax evasion. Fethi et al (2005) employed monetary and non-monetary methods over the period 1960-2003 to empirically investigate the size of the Cypriot underground economy. Similarly, Georgiou and Syrichas (2004) utilized the currency approach for the period 1960-1990.

Technological solutions have been used by various governments around the world to detect and combat tax evasion (OECD 2017). Employment of technology made a compelling case in particular as the shadow economy is evolving along with technological changes and advancements and new risks arising. Before choosing, however, among the various tools available the extent of the problem, i.e. the size of the shadow economy, needs to be estimated.

This study will provide estimates of the shadow economy in Cyprus using both (i) the direct/micro approach based on household data (using different household data sources for Cyprus) as well as (ii) the indirect/macro approach. The objective is to provide more comprehensive estimates (as well as ranges) of the shadow economy in Cyprus that could help policy makers in designing and adopting more cost effective measures in dealing with tax evasion. The final report of the project is expected in the second half of 2019.

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II.6 Cyprus's competitiveness: IMD World Competitiveness Yearbook 2019

S. Andreou and N. Pashourtidou

CypERC acts as a Partner Institute of the IMD World Competitiveness Center for the 2019 edition of the IMD World Competitiveness Yearbook, including the Digital Competitiveness and Talent Rankings. CypERC contributes via the collection of the necessary hard data for Cyprus, i.e. about 60 indicators that cover economic performance, government efficiency, business efficiency, infrastructure and digitalization. The data supplied to the IMD should conform to the definitions and time span required by the IMD for the computation of comparable competitiveness rankings

across countries. Moreover, CypERC collaborates with the IMD in the distribution of the opinion survey to business executives in Cyprus.

The results in World Competitiveness Yearbook are sent to partner institutes before their release for the preparation of press releases for the local media. The results of competitiveness rankings for Cyprus are analysed in a specialised Bulletin (in Greek) prepared at CypERC and circulated electronically to a large mailing list that includes local media, policy makers, organisations, business, etc.

II.7 Survey of Health, Ageing, and Retirement in Europe (SHARE)

A. Polycarpou and N. Theodoropoulos

Cyprus is participating in the 8th wave of the Survey of Health, Ageing, and Retirement in Europe (SHARE). The University of Cyprus is the host institution for the SHARE Cyprus team and the members of the SHARE team are affiliated with the Economics Research Centre. The 8th wave of the SHARE is co-funded by: (i) the European Commission through the DG Employment action “Supporting the Eighth Wave of SHARE: Preparation of the Field-Work in Several EU member States”, (ii) the University of Cyprus with in-kind contribution, and (iii) the Ministry of Finance with the amount of €63.000. In addition, the local Directorate General of European Programmes, Coordination and Development (ESFRI) office has provided the €10.000 annual fee so that Cyprus becomes a SHARE-ERIC (European Research Infrastructure Consortium) member.

SHARE is a cross-national longitudinal population survey focusing on the interactions among employment, health, economic and social status with a European focus. Cyprus participated for the first time in Wave 7 of SHARE which took place in 28 countries – all EU member states except Ireland and England, plus Israel and Switzerland. The goal of the survey is to analyse the process of population ageing in depth by gathering extensive data all across Europe covering the interplay between economic, health and social factors in shaping older people’s living conditions.

The SHARE Cyprus team is responsible for: (i) translating the questionnaire into Greek, as well as translating other survey-related documents; (ii) testing the instrument in three rounds of fieldwork: a. pre-test, b. field rehearsal and c. main survey; (iii) monitoring that the local survey agency correctly implements SHARE; (iv) controlling quality and serving as a mediator between SHARE Central and the local agency; (v) providing feedback to SHARE-ERIC based on the three rounds of fieldwork; (vi) attending the scheduled SHARE meetings and training sessions; (vii) providing support in cleaning the collected data; (viii) preparing the preloaded database for the next wave; (ix) providing extra support and feedback to SHARE-ERIC when specific country questions or issues arise. In addition, the SHARE Cyprus team is responsible for preparing a report with a description of the data collected in the 7th wave using descriptive statistics and drawing some first general conclusions. The final scientific report with the main results and conclusions for Cyprus based on wave 7 SHARE data will be presented at the Ministry of Finance in September 2019.

II.8 Evaluating the impact of Active Labour Market Policies in Cyprus

L. N. Christofides and A. Polycarpou

The Economics Research Centre (CypERC), in collaboration with the Ministry of Finance and the Ministry of Labour, Welfare and Social Insurance, has undertaken a study to assess the provisions and potential impacts of Active Labour Market Policies (ALMP) in Cyprus, as well as the aspects of

Guaranteed Minimum Income scheme that contain ALMP. A brief review of the techniques of evaluating ALMPs has been carried out focusing on Impact Evaluation which represents a more recent and relatively rigorous evaluation technique of labour market policies, used by both academics and policy makers. Based on the finding of the review, quasi-experimental techniques and in particular regression methods adjusted for observables and unobservables, as well as instrumental variable techniques could be applied to evaluate specific ALMPs in Cyprus, given data availability. The application of the aforementioned ALMP Impact Evaluation approaches will face various challenges such as (i) the construction of the relevant database, (ii) the specification of the counterfactual/control group, (iii) the robustness of the empirical results to model specifications and (iv) the choice of instruments, among others. The CypERC has the research expertise to apply these techniques, given the relevant data are available for use.

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II.9 The evaluation of the effects of the Cyprus crisis on wage costs and competitiveness

L. N. Christofides

The Cyprus crisis can be thought of as beginning in May 2011, when the country was shut out of the international borrowing markets and ending in 2016, when noteworthy GDP growth returned. Beginning with the 2012 budget, adopted in December of 2011, and during the Memorandum of Understanding years of 2013-2016, a number of wage measures were approved, mostly for the public sector. The objective of this research project is to study the gross and net initial impact of these measures on public sector nominal wages and to estimate the largely endogenously generated gross wage reductions in the private sector, with the view to calculating the overall wage moderation brought about by the Cyprus crisis. In light of the price deflation that occurred during the Cyprus crisis, the nominal wage reductions were attenuated when viewed in real terms and it is important to also study the real changes in wages that occurred during this period.

CYSTAT data suggest that, over the period 2013-15, nominal earnings declined by 5.4% while real earnings (moderated by price deflation) declined by 1.5%. Earlier and subsequent years need to be also looked at. That these declines are more modest than one might have expected, given the severity of the crisis, is due to the fact that many of the measures undertaken were not in the form of nominal wage cuts but consisted instead of various charges and contributions that amounted to decreases in after-tax incomes. It is important to record all the measures that were imposed in both the public and private sectors and to construct estimates of the overall nominal and real impact on wages. Data from all available sources need to be considered and used to build a picture about the evolution of nominal and real, gross and net earnings through the crisis and as recently as possible. It is also important to reconcile these changes with the published calculations on unit labour costs.

It is generally accepted that nominal and real wage growth prior to the Cyprus recession had been excessive, that it impaired competitiveness and that it contributed to excessive consumption and private indebtedness. Thus, the wage moderation achieved during the crisis would be an important element in current discussions about (a) the extent to which competitiveness has been enhanced, (b) wage claims currently made by unions can be justified, (c) the competitive ability of the tourist sector to survive if the geopolitical landscape around us improves, (d) our international trading performance and (e) our ability to grow and to repay our debts. The improvement in the government debt to GDP ratio has not been matched by a decline in private indebtedness and non-performing loans, are still a major problem in the economy.

In short, the wage 'correction' achieved during the crisis will help shape the performance of the Cypriot economy in the years to come. It is, therefore, important to measure changes in the wage competitiveness of Cyprus using all available data and to draw appropriate policy implications.

The labour market outcomes are many, but prominent among them are employment and wage remuneration. An analysis of the labour market in the period leading up to and through the crisis should encompass an analysis of the impact of the crisis on both these outcomes. A complementary proposal to study employment has been proposed by A. Polycarpou, of the ERC. While the present proposal is put forward as an independent study of wage outcomes, it is hoped that, after a good understanding is achieved regarding the individual variables employment and wages separately, a collaborative effort will unfold which will, in the context of a complete model of the labour market, provide solutions for both endogenous variables.

Such as model could build on the historical evolution of employment and earnings in the public sector and the influence of these on the labour market of the private sector. The latter might be based on a model of Nash bargaining between employers and employees, with outside options and bargaining power being influenced by the evolution of employment and wages in the public sector, themselves influenced by the exogenous interventions of the lenders through the Memorandum of Understanding. The impact of the austerity measures in the public sector on the private sector could then be traced out and the overall evolution of the aggregate labour market determined.

The wage study will involve careful study of the crisis period 2012-2016 and considerable data processing leading up to the wage equations that will be estimated. The outcome will, in the first instance, be a discussion paper on wages. In the event that a joint employment/wages study follows, a further discussion paper describing their joint determination would emerge. Depending on data availability and the results obtained, both discussion papers would, in the first instance appear under the auspices of the ERC and then be submitted to international professional journals for publication. They must, therefore, meet the high professional standards required by the profession.

II.10 Recent developments in the European public-private pay gap

L. N. Christofides

In a study (jointly authored with Maria Michael) entitled "The Impact of Austerity Measures on the Public-Private Wage Gap in Europe", which has appeared as an Economic Policy Paper (CypERC) and has also been submitted for publication in a good professional journal, we use the EU SILC Surveys for 2008-2014 to study the public-private wage gap in 31 European countries (the EU28, plus Croatia, Norway and Switzerland). When the paper was initiated, these were the only surveys that were then available. They provide information on individual characteristics, labour market and

sector involvement, and earnings for thousands of individuals in each of the 31 countries. The variables used in these surveys are constructed with care and are comparable across the 31 countries. It was, therefore, possible to study the public-private sector wage gap, controlling for personal productive characteristics, such as education, occupation, age, etc., in a fashion that was common to all countries.

Having processed the information provided in these surveys and constructed data sets which are suitable for comparisons between the public and private sectors of these countries, we then calculated the public-private wage gap in each of the seven years and 31 countries, decomposing it into a portion attributable to productive characteristics (the explained portion) and the remaining portion which is left unexplained – Oaxaca and Ransom (1994). We also studied the entire distribution of the wage gap, also decomposing its quantiles into explained and unexplained components, using recently developed econometric techniques (Chernozhukov et al (2013)). The explained portions can be thought of as reflecting Mincer earnings arising from productive characteristics and require no further explanation for our purposes. The unexplained components of the wage gap, at the mean and various quantiles, are the items that constitute a puzzle and may reflect a number of structural characteristics in the 31 countries, namely relative unionisation between the public and private sectors, the degree of centralisation of collective bargaining, the existence of lobbies more generally, governance and the power of the country executive and legislative branches to impose the broader good over that of individual entities. We studied the impact of austerity measures (wage freezes and cuts) undertaken in the public sector during the international and sovereign crises on the wage gap and found, using static and dynamic panel data econometric methods (Arellano and Bond (1991)), statistically significant negative impacts of austerity on the wage gaps at the median, the 90th quantile and positive, but weaker, effects at the 10th quantile. In many countries, the impact of the crisis was to twist the quantile function, making a negatively sloping one even more negative in slope. This shift, provides further unexplained premia to public sector low-paid employees and no premia or even negative ones to the public sector high-paid employees. We examined country characteristics which may lead to these results and obtained some suggestive ideas in a related preliminary study.

Since this work, two more EU SILC surveys (2015 and 2016) have appeared. In this proposal, we intend to use the additional information in the new surveys to complete three broad tasks which complement our earlier work. First, to extend the work we have done so far to a longer period. This has distinct econometric advantages as it provides more data to support the, often intricate, econometric estimations involved in the estimation of quantiles and their decompositions into explained and unexplained components. A second reason for the extension to 2016, is that it allows for a more careful assessment of the effects of austerity on certain countries. Cyprus, for instance, is a country where the first significant measures were approved in December 2011 for the 2012 budget and the Memorandum of Understanding did not expire until 2016, clearly outside the period covered by the earlier study. In that case, we were not able to investigate the effects of the whole cycle of austerity measures on the pay gap. With the two additional surveys we will be able to. Finally, a problem bedeviling study of the structural reasons why 14 countries had small pay gaps and more modest crisis problems, while 8 other countries were forced to seek external financial assistance and submit themselves to externally imposed economic policy and austerity, is that with 31 countries and only seven years the number of observations that can be mustered is at most 217. Indeed, it is less than that because, at the beginning of the period (2008), many of the EU 28 did not have data on important variables (e.g. unionisation density and coverage in the public and private

sectors). The two recent surveys will not only provide additional observations but these will come from a period of more complete data availability on a number of structural indicators.

For these three reasons, we propose to produce a Discussion Paper which performs these tasks and would ultimately be submitted for publication to a good professional journal. This paper will cover the longer period, allow for a more complete study of the crisis period for countries that had not recovered by the time of the 2014 EU SILC, and enable a statistically more secure study of the structural reasons that separate the 31 countries into 14 that had low public-private wage gaps and no need for external intervention, and 8 other ones which had to submit to externally imposed economic policy and austerity. This issue was not resolved in our first study of the public-private wage gap.

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II.11 Can the income tax system explain differences in labour supply outcomes across countries? A comparative microsimulation analysis

P. Lyssiotou

Recent studies have shown that there are significant differences among OECD countries with regard to the employment and working hours of the population (i.e. Prescott, 2004, Rogerson, 2006, 2009, Ohanian, Raffo και Rogerson, 2007). Factors that have been proposed to possibly explain these differences are the income tax system, institutions, preferences and culture of the population of a country.

In this study, we examine the extent to which the structure of the income tax system can explain differences in labour supply outcomes across countries. In order to minimise differences in preferences due to culture, we concentrate on South European countries and specifically Cyprus, Greece and Italy. Based on ancestry, language and cultural indices (Spolaore και Wacziarg, 2016; Spolaore και Wacziarg, 2015), these three neighbouring countries share a common cultural background and similar preferences. Despite this, the employment rates across these three countries exhibit differences. Based on Eurostat data in 2007, the employment rate of men and women in Cyprus was 80% and 62.4% respectively. The corresponding figures in Greece were lower and specifically 74.2% and 47.7% respectively. They were even lower in Italy; 70.6% for men and 46.6% for women.

The income tax system in all three countries is individual and progressive. However, there are differences regarding the amount of income that is exempt from taxation and the marginal tax rates. The Cypriot income tax system is more generous as the marginal tax rates are much lower compared to those in Greece and Italy. Also, the amount of taxable income that is exempt from taxation is almost double that in Greece in 2007 whereas the Italian tax system does not exempt any amount of income from taxation.

We conduct the empirical analysis using data from the 2007 European Union Statistics on Income and Living Conditions (EU-SILC) and the Tax-Benefit Microsimulation Model for the European Union (EUROMOD), which is maintained and developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex in collaboration with national teams of EU member states.

We restrict the sample to single men and women without children in order to minimize heterogeneity in preferences. Also, the structure of benefits for single individuals is more similar across the three countries. As such, we can concentrate on investigating the impact of financial incentives created by the structure of the income tax system on employment and working hours.

We first estimate a structural discrete choice model of labour supply for each country. A similar model was estimated recently by Bargain, Orsini and Peichl (2014) to estimate and compare labour supply elasticities for EU countries and the US. Afterwards, we examine the impact of the income tax system on labour outcomes by swapping the tax system of each of the three countries and examining the implications on non-participation, part time and fulltime work by gender across the three countries.

II.12 Constructing productivity indicators

Th. Mamuneas

The economic crisis has highlighted the central role of productivity developments in the competitiveness and growth prospects of the economy. Therefore, it is vital for an economy to monitor both its overall productivity, and the productivity in the sectors of economic activity that make up the economy. Productivity is a measure of the economic well-being of a country, measuring how efficiently the factors of production in an economy are transformed into the final product.

There are two definitions of productivity, labor productivity and total productivity. Of course, the two measures are interrelated. Labor productivity is the proportion of the output of goods and services to the hours of work allocated to the production of these goods and services. From policy perspective, labor productivity is important as a reference in wage negotiations. Using the increase in labor productivity and wage rates, one can assess the labor costs per unit of labour, or the labour-related competitiveness of an economy or sector. Total productivity measures the proportion of output of goods and services that is not explained by the contribution of labor and capital to an economy, and for this reason is considered to be the most important productivity measure. The total productivity index reflects inefficiencies, resource reallocations in productive uses, and developments in know-how.

The objective of the proposed project is the construction of Tornqvist indicators for total productivity and labor productivity for the Cypriot economy as a whole, and for individual sectors. Moreover, the relationship of productivity indicators with indicators of competitiveness (such as the World Competitiveness Center's indexes of the IMD Institute) and the various sub-components that make them up will be studied, in an effort to propose guidelines for economic policy. Data for the construction of the aforementioned indicators will be collected every six months (or annually) and the estimated productivity indicators will be presented in a biannual (or annual) report so that there is a continuous monitoring of the productivity of the economy.

Productivity is of utmost importance for economic growth and the competitiveness of an economy. Consequently, monitoring and explaining changes of productivity over time constitutes an important tool for the formation of growth-enhancing economic policies.

II.13 The evolution of car ownership in Cyprus

S. Clerides

A car is the largest item most individuals will ever purchase (besides a home), hence economists have dedicated much effort in analyzing the factors that determine car purchase decisions. Important methodological advances in the 1990s have made possible the estimation of rich static demand models for differentiated products like cars. More recently, attention has shifted to dynamic aspects of consumer behavior. Work in this area is still relatively sparse, largely because of data limitations. Existing research on durable goods relies primarily on aggregate data that do not include consumer information or on cross-sectional consumer data that do not track consumers' purchasing patterns over their lifetime.

In a project funded by the Research Promotion Foundation, we aim to make a contribution to the literature by exploiting a unique dataset that records every vehicle registration in Cyprus since 1970 and every transfer of ownership since 1987. This information allows us to track every vehicle's entire ownership history and every individual's automobile holdings over time. We can thus build on our existing research program, which has utilized a subset of this dataset to analyze the impact of used car imports (Clerides 2008) and the design of an emissions-based tax system (Christodoulou and Clerides 2012), Adamou and Clerides 2013).

Our first task is to conduct a descriptive analysis of the data. We will focus on detecting patterns in the data and establishing key stylized facts. How long do people hold on to their cars? How does an individual's stock of vehicles evolve over time? What is the extent of multiple ownership and what do vehicle "portfolios" look like? What is a typical vehicle's ownership history and how long does it stay on the market? How does the age profile of the overall stock of vehicles change over time?

The answers to these questions will provide valuable insights into consumer purchases of durable goods. They will also allow us to evaluate the effects of specific policies, such as the tax reforms of 2003, 2006 and 2013, as well as the impact of macroeconomic developments, such as the deep recession in 2013-14.

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II.14 Technological progress, trade and conflict

C. Hadjiyiannis

We investigate the impact of technological progress on the probability of military conflict between countries. More specifically, we test the hypothesis that technological progress has changed the

importance of other factors determining the probability of conflict. For example, geographical distance is less important now than it was several decades ago because of technological progress.

We use a probit gravity model and the Correlates of War dataset just as in Martin, Mayer and Thoenig (2008) and Hadjiyiannis, Heracleous and Tabakis (2016) to estimate the probability of conflict. We also include genetic, religious and linguistic distances as proposed by Spolaore and Wacziarg (2016) as determinants of conflict. We confirm the results of the papers above and the hypothesis that technological progress has changed the importance of geographical distance as a determinant of conflict. We proceed to show how this effect is changing the probability of war over time between Cyprus and its partners and other European Union members and their partners as well as other countries in the region.

We proceed to show how this effect is changing the probability of war over time between Cyprus and its partners and other European Union members and their partners as well as other countries in the region.

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II.15 The impact of compulsory pre-primary education on inequality in Cyprus

A. Kourtellos

Recently, there has been a lot of evidence that investment in early education especially for disadvantaged children from birth to age 5 plays a major role in children's future educational and labor market outcomes. In particular, the recent literature on human development through adolescent and early adulthood, as summarized by Heckman and Mosso (2014), has documented the importance of investments in the human capital in the early years of life. Interestingly, it has been shown that the gaps in cognitive and more importantly in socioemotional skills form before primary schooling, then widen, and persist throughout life. Thus, it is more efficient for the society to prevent the emergence of these gaps at the start rather than employ inefficient redistributive policies later on in life.

In this spirit, our study aims at estimating the effect of an increase of general education on children's outcome in Cyprus. In 2004, the Cyprus government implemented compulsory pre-primary education for the children of age 4 8/12 – 5 8/12. This reform has also been associated with an increase in the demand for kindergartens for children of younger age. In doing so, we draw data from EU-SILC and national Family Expenditure Survey to study inequality in childhood experiences and learning which yields gaps in ability, achievement, health, which in turn can be used to predict adult labor market outcomes. To the extent that this policy affected disadvantaged families and occurred within the critical and sensitive periods of the formation of skills we expect the return of this policy to be substantial both for socioeconomic outcomes such as reducing high school dropout rates, teenage delinquency, and the need for special education. To the extent that the data will allow us we will also investigate the existence of dynamic complementarities, which refers to the idea that

the early investments in human capital make future investments in adolescence and young adulthood more productive.

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II.16 What determines bank lending standards in Cyprus?

Ch. Savva

Banks are the key providers of funds in most advanced economies (Hartmann et al., 2003; Allen et al., 2008). Therefore, it is crucial to understand the factors affecting their decisions with regards to loan granting. In contrast to changes in the interest rate, which affect mostly the demand side of bank lending (i.e. loan receivers), bank lending standards – the lending terms and conditions specified in a loan contract – provide a core piece of information on the factors affecting loan granting in a country.

Just to highlight the importance of bank lending standards van der Veer and Hoeberichts (2016) find that, in the Netherlands, a one point tightening reduces a bank's quarterly growth rate of business lending by about half a percentage point until bank lending standards are eased. This level effect of bank lending standards helps to explain low bank lending growth after a period of prolonged tightening as well as high bank lending growth in a period of prolonged easing, also providing another potential indicator for macroprudential policy. Similarly, Bassett et al., (2014) find that tightening shocks to this credit supply indicator lead to a substantial decline in output and the capacity of businesses and households to borrow from banks, as well as to a widening of credit spreads and an easing of monetary policy. Cappiello et al., (2010) use a panel of euro area countries to further empirically confirm this relationship.

Still, the area is vastly under-researched. The most related paper on this topic is Maddaloni et al. (2009) who use the comprehensive Bank Lending Survey from the Euro Area in a panel setup and aim to identify the impact of monetary policy on banks' appetite for risk. Overall, their results suggest that lower overnight rates soften bank credit standards (CS). Banks appear to soften their CS by reducing spreads on average loans, but also by reducing collateral requirements and covenants and by increasing loan amount and maturity. The softening of CS is for all types of loans but the impact is bigger for loans to nonfinancial corporations. On a similar note Maddaloni and Peydró (2011), confirm that lower interest rates can reduce lending standards, using US and Euro Area data. Interestingly, they find that low long-term interest rates do not soften lending standards.

Overall, all studies in the previous literatures have, at least to our knowledge, taken into consideration the issue of the risk-taking channel of monetary policy (tackled, inter alia, by Jiménez et al., 2014; Ioannidou et al., 2014; Ciccarelli et al., 2015; Bonfim and Soares, 2018) and have reached the conclusion that bank lending standards are weakened when interest rates are lower.

With regards to the determinants of bank lending standards, there has, thus far, been very little effort to quantify them. Other than the short-term interest rate and the voluminous literature on the risk taking channel of monetary policy, there has been very little effort to identify the determinants of bank lending standards. Of the few existing studies which have tackled this issue,

Kara et al., (2016) find that securitization only has a small impact on lending standards. The results of Maddaloni et al. (2009) and Maddaloni and Peydró (2011) suggest that lending conditions are countercyclical, i.e. that higher real GDP growth tends to soften lending standards, while these are tightened in downturns. An early summary of the studies dealing with the determinants of bank lending standards can be found in ECB (2009).

Given the absence of a specific study which elaborates on the determinants of bank lending standards, it is thus unsurprising that no effort has been made to elaborate on this aspect of bank behavior in Cyprus. To this end, we propose the estimation of a VAR model with bank lending standards (available from 2009Q2 to 2018Q4), real GDP, demand for new lending, inflation, and the Euribor interest rate. Given that interest rates in Cyprus tended not to reflect changes in the European level, we also propose the use of the CY long-term bond for comparison purposes. Finally, we also intend to employ the Residential Property Price Index in order to elaborate on whether real estate prices can have an impact on bank lending behavior.

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II.17 Long-term energy and environmental planning in Cyprus

Th. Zachariadis

This project continues related research activities of the previous years, which were published in the Economic Policy Papers series of CypERC and in the journal “Cyprus Economic Policy Review” in years 2014-2017. This work is carried out in the frame of the provision of technical assistance to the Cypriot energy and environmental authorities for their preparation of the National Energy and Climate Plan of Cyprus, as required from all EU Member States. During 2019, this activity will focus on the following topics:

1. Update of the long-term forecasts of energy demand up to 2030 and 2050 in each sector of the Cypriot economy (residential, commercial, industrial sectors and transport), based on revised official macroeconomic forecasts and projections of the evolution of international energy prices.
2. Scenario-based assessment of the effect of specific energy and environmental policy measures on these forecasts, as well as on forecasts of emissions of air pollutants and greenhouse gases.
3. Extension of the methodology that was developed in 2018 for the cost-effectiveness analysis of policies and measures to reduce economy-wide greenhouse gas emissions in Cyprus in order to fulfil national environmental commitments for year 2030 at least cost. For this purpose a constrained optimization model will be developed, taking into account realistic technical and financial constraints as well as the various mandatory environmental targets of Cyprus.

II.18 Impact assessment of the Cyprus Integrated National Energy and Climate Plan

Th. Zachariadis and S. Andreou

This project is funded by the European Commission's Structural Reform Support Service. It is coordinated by the Cyprus University of Technology and will be conducted in collaboration with the Cyprus Institute and CypERC. The project involves an impact assessment of the integrated National Energy and Climate Plan (NECP), which the government of Cyprus will submit to the European Commission in 2019. The assessment will be compatible with the requirements as set out in Article 8 of the Regulation on the Governance of the Energy Union and will include an assessment of:

- (a) The impacts of policies and measures which are planned by the government of Cyprus on the development of the energy system and greenhouse gas emissions and removals up to the year 2050 (including for the year 2030).
- (b) The economic, environmental and social impact of policies and measures which are planned by the government of Cyprus up to the year 2050 (including for the year 2030).

The assessment will also include a comparison with “reference case” projections up to 2050, i.e. those based on existing policies and measures. CypERC will be responsible for assessing the impact of these policies on a) productivity, competitiveness and employment by main economic

sector and b) energy affordability by income group and socio-demographic group of Cypriot households.

The final report of the project is expected in the first half of 2020. A relevant working paper or summary report with the findings of CypERC's work in the project will be published at the same time and disseminated through its Newsletter.

Appendix: Publications 2018

Economic Policy / Analysis Papers

Number	Title	Authors
01-18	Forecasting economic activity in sectors of the Cypriot economy using VAR models	Nicoletta Pashourtidou Christos Papamichael
02-18	Measuring the permanent-temporary wage gap in Cyprus	Christos Koutsampelas
03-18	Determinants of Non-Performing Loans in Cyprus: A Bayesian VAR approach	Nektarios Michail Christos Savva
04-18	The Impact of Austerity Measures on the Public-Private Sector Wage Gap in Europe	Maria Michael Louis Christofides
05-18	"On the Cost-Effectiveness of National Economy-Wide Greenhouse Gas Emissions Abatement Measures",	Chryso Sotiriou Apostolos Michopoulos Theodoros Zachariadis
06-17	The Unified Database of Household Budget Surveys 1984/85, 1990/91, 1996/97, 2003, 2009 and 2015/16 (in Greek)	Alexandros Polycarpou
07-18	Aspects of the social protection system in Cyprus: A process evaluation	Louis Christofides Christos Koutsampelas

Articles in the Cyprus Economic Policy Review

Volume 12	Title	Authors
Number 1 June 2018	Does Balance Sheet Strength Drive the Investment Cycle? Evidence from Pre - and Post Crisis Cyprus	Sophia Chen Yinqiu Lu
	Sectoral linkages and economic crisis: An input-output analysis of the Cypriot economy	Elias Giannakis Theofanis P. Mamuneas
	Non-standard employment in Cyprus: Trends and policy responses	Christos Koutsampelas
	Scoring rules for simple forecasting models: The case of Cyprus GDP and its sectors	Elena Andreou Andros Kourtellos
Number 2 December 2018	Financial knowledge among university students and implications for personal debt and fraudulent investments	Panayiotis C. Andreou Dennis Philip
	Forecasting economic activity in sectors of the Cypriot economy	Nicoletta Pashourtidou Christos Papamichael Charalampos Karagiannakis
	Does Housing Wealth Affect Consumption? The Case of Cyprus	Nektarios A. Michail George Thucydides
	Factors Affecting Housing Prices: International Evidence	Christos S. Savva

Articles in the CypERC Newsletter (in Greek)

Issue	Title	Authors
	Παράγοντες που επηρεάζουν την παραγωγικότητα των ευρωπαϊκών οικονομιών	Έλενα Κεττένη Θεοφάνης Μαμουνέας Πάνος Πασιαρδής
	Κλαδικές διασυνδέσεις και οικονομική κρίση: Ανάλυση εισροών-εκροών της κυπριακής οικονομίας	Ηλίας Γιαννάκη Θεοφάνης Μαμουνέας
	Οι προσδοκίες των υποψήφιων φοιτητών για τις οικονομικές αποδόσεις της τριτοβάθμιας εκπαίδευσης: Η περίπτωση της Κύπρου	Μαρία Ηλιοφώτου Σοφία Ν. Ανδρέου Ηλίας Μαρκάτζης
Αρ. 36 Μάρ.2018	Κανόνες βαθμολόγησης για απλά μοντέλα πρόβλεψης: Η περίπτωση του κυπριακού ΑΕΠ και των τομέων του	Έλενα Ανδρέου Άντρος Κούρτελλος
	Πιστωτικοί περιορισμοί για τις ΜΜΕ στην Κύπρο κατά την περίοδο 2010-2013 και επιδράσεις στην απασχόληση, στους μισθούς και στις τιμές	Χαράλαμπος Χαραλάμπους Μάριος Πολεμιδιώτης
	Η ανάπτυξη μετά την κρίση στην Ευρώπη. Η αλληλεξάρτηση των μακροοικονομικών και διαρθρωτικών πολιτικών	Roumeen Islam
	Το ερευνητικό πρόγραμμα Survey of Health, Ageing and Retirement in Europe (SHARE)	Νίκος Θεοδωρόπουλος Αλέξανδρος Πολυκάρπου
	Αξιολόγηση ανταγωνιστικότητας της Κυπριακής οικονομίας	Νικολέττα Πασιουρτίδου
	Άτυπη απασχόληση στην Κύπρο: τάσεις και προτάσεις πολιτικής	Χρήστος Κουτσαμπέλας
Αρ. 37 Οκτ.2018	Μετρώντας το μισθολογικό χάσμα μεταξύ μόνιμων και προσωρινών εργαζόμενων στην Κύπρο	Χρήστος Κουτσαμπέλας
	Συστήματα εξισώσεων για πρόβλεψη του ρυθμού ανάπτυξης τομέων της Κυπριακής οικονομίας	Νικολέττα Πασιουρτίδου Χρήστος Παπαμιχαήλ
	Αξιολόγηση της αποτελεσματικότητας των ενεργών πολιτικών αγοράς εργασίας στην Κύπρο	Αλέξανδρος Πολυκάρπου

2018

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CypERC Director, Professor, Department of Economics, University of Cyprus

Marios Clerides
Economist, Former Director of Central Cooperative

Michael Michael
Professor, Department of Economics, University of Cyprus

George Panteli
Head of Economic Research and European Union Affairs, Ministry of Finance

Ioannis Tirkides
Senior Economist, Bank of Cyprus

Academic Council

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Panayiota Lyssioutou Theofanis Mamuneas Christoforos Pissarides

External Academic Fellows

Theodoros Zachariadis Christos Savva
Costas Hadjiyiannis Louis Christofides

The annual report is also available in electronic form on the CypERC website:

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Head of Economic Research and European Union Affairs, Ministry of Finance

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