

ECONOMICS RESEARCH CENTRE

UNIVERSITY OF CYPRUS

Research Plan 2020

**SOURCES OF FUNDING OF RESEARCH ACTIVITIES AT
THE ECONOMICS RESEARCH CENTRE**

Sponsorships

Central Bank of Cyprus

Ministry of Finance

Earmarked Sponsorships

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

Contracted Research Projects

Title	Source of funding	Co-ordinator
Joint Harmonised EU Programme of Business and Consumer Surveys: Cyprus	(1) European Union (European Commission, DG-ECFIN) (2) Ministry of Finance (3) University of Cyprus	Prof. E. Andreou
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
The Econometrics of Intergenerational Mobility (MetricIMO)	Marie Sklodowska-Curie fellowship (European Union)	Associate Prof. A. Kourtellos
Mixed Data Sampling (MIDAS) models: Theory and Application	Research Promotion Foundation (RESTART 2016-2020, Excellence Hubs)	Prof. E. Andreou
Dynamic consumer behavior in car ownership	Research Promotion Foundation (RESTART 2016-2020, DIDAKTOR Post-Doctoral Research)	Prof. S. Clerides (Post-Doctoral researcher: A. Adamou)
Impact assessment of the Cyprus Integrated National Energy and Climate Plan	European Commission (Structural Reform Support Service)	Associate Prof. T. Zachariadis, Cyprus University of Technology. In collaboration with the Cyprus Institute and the Economics Research Centre.
Group factor models	Research Promotion Foundation (RESTART 2016-2020, International Collaborations Dual Targeting)	Prof. E. Andreou
Composite leading indicator	Hellenic Bank	Prof. E. Andreou

CONTRIBUTORS

Elena Andreou	Director
Nicoletta Pashourtidou	Assistant Director
George Syrichas	Advisor
Christoforos Andreou	Researcher
Sofia Andreou	Researcher
Christiana Anaxagorou	Researcher
Neophyta Empora	Researcher
George Papadopoulos	Researcher
Louis N. Christofides	Academic Advisor
Sofronis Clerides	Academic Advisor
Maria Eliophotou	Academic Advisor
Andros Kourtellos	Academic Advisor
Theofanis Mamuneas	Academic Advisor
Nicos Theodoropoulos	Academic Advisor
Christos Savva	Academic Advisor
Theodoros Zachariadis	Academic Advisor

CONTENTS

1. Business and Consumer Surveys.....	5
2. Macroeconomic forecasts for Cyprus	6
3. Survey of Health, Ageing, and Retirement in Europe (SHARE).....	7
4. The interconnection between financial crises and the shadow economy: The case of Cyprus	8
5. Income under-reporting and the shadow economy: What does the HFCS suggest for Cyprus and the euro area?	10
6. Survey-derived proxies for uncertainty: the case of Cyprus.....	12
7. Constructing productivity indicators.....	13
8. Cyprus' competitiveness: IMD World Competitiveness Yearbook 2020	14
9. New developments in the social safety network and minimum wages in Cyprus....	15
10. Bank competition and interest rates in Cyprus.....	17
11. The link between secondary technical/vocational education and the labour market in Cyprus	18
12. The phenomenon of overeducation in Cyprus.....	19
13. Public debt thresholds: An analysis for Cyprus.....	21
14. Long-term energy and environmental planning in Cyprus	24
Deliverables 2020.....	26

1. Business and Consumer Surveys

C. Anaxagorou, S. Andreou 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 a summary in English) 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.

Following a testing phase in 2019, a new question on the level of perceived uncertainty will be introduced in all questionnaires in 2020. The survey responses will be used to construct direct measures of uncertainty. The interest in measuring uncertainty stems from empirical evidence showing that higher uncertainty has adverse effects on employment and activity, particularly investment. Monitoring the level of uncertainty in the economy via the relevant indicators is useful for both practitioners and policymakers, especially as the level of uncertainty could influence the effectiveness of economic policies (e.g. European Central Bank 2016).

A new call for proposals for Business and Consumer Surveys will be launched by the European Commission in April 2020 with deadline in summer 2020.

References

European Central Bank, 2016. The impact of uncertainty on activity in the euro area. Economic Bulletin, Issue 8.

2. Macroeconomic forecasts for Cyprus

C. Anaxagorou, S. Andreou and N. Pashourtidou

(i) GDP growth and inflation

One of the regular research activities at the Centre involves the construction of forecasts for GDP growth and inflation in Cyprus on a quarterly basis. 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 four times a year 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) Sectoral growth forecasts: understanding real-time performance

Another regular activity is the construction of forecasts for the growth rate of the production-side components of GDP that appear in the quarterly National Accounts. The forecasts are updated every quarter and sent to the CypERC sponsors. The forecasts cover the Gross Value Added (GVA) 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 constructed 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; subsequently GDP growth forecasts are obtained by aggregating the unconstrained component forecasts.

Real-time evaluations of the forecasting performance have shown that GDP growth forecasts from the direct approach outperform those from the bottom-up approach. Moreover, in recent forecast rounds, GDP growth forecasts from the bottom-up approach are much more optimistic than the corresponding forecasts from the direct approach, mainly as result of higher growth forecasts in the sectors of construction, information and communication, professional and administrative services, and other services. Some of the abovementioned sectors are associated with high volatility, in terms of output growth, and a worsening real-time forecasting performance. In order to better deal with idiosyncratic features of the sectors and to improve the forecasting performance at the sectoral level, the use of a smaller set of domestic predictors will be investigated. Specifically, activity growth in each sector will be forecast using sector-specific predictors, similar, where possible, to those used in the construction of the flash estimate by the Statistical Service. Previous work

showed that the use of pre-selected predictors for forecasting sectoral GVA may lower forecast errors (Pashourtidou et al. 2018).

The small set of domestic predictors will be employed in single equation dynamic models (ADL models) for the growth rate of each production-side component. The resulting component forecasts will be aggregated to obtain bottom-up GDP growth forecasts. The performance of component and aggregate growth forecasts computed from the smaller set of predictors will be compared to that of forecasts constructed under the two approaches described above (i.e. using a dataset of about 300 domestic and foreign indicators). The stability of the forecasts and the drivers behind forecast failure will be explored. This exercise is expected to reveal whether and when (e.g. slowdown, recession, recovery, etc.) popular domestic indicators can lead to more accurate forecasts vis-à-vis a larger set of series. Moreover, closely monitoring sectoral forecasts based on a small set of domestic indicators may add to the understanding of sectoral fluctuations, particularly in volatile sectors, and improve the assessment of risks to the outlook.

References

Pashourtidou, N., Papamichael C. and Karagiannakis C., 2018. Forecasting economic activity in sectors of the Cypriot economy. Cyprus Economic Policy Review, 13(1), 24-66.

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

N. Empora and N. Theodoropoulos

Cyprus is currently 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 8th wave using descriptive statistics and drawing some first general conclusions.

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

4. The interconnection between financial crises and the shadow economy: The case of Cyprus

C. Andreou, E. Andreou and G. Syrighas

The size of the shadow economy is of great interest to researchers and policymakers alike. Particularly, the shadow economy is associated with all economic activities that are hidden from the authorities, and therefore are neither taxed nor included in national statistics (Schneider & Dell'Anno, 2003; Schneider and Buehn, 2017; Schneider, 2016; Smith, 1994). Several studies estimate the shadow economy in Cyprus using micro and macro approaches (Georgiou & Syrighas, 1994; Pashardes and Polycarpou, 2008; Fethi, Fethi, and Katircioglu, 2006) and the most recent estimation is in 2015 (Medina and Schneider, 2018).

The aim of this study is twofold. Firstly, to re-estimate the shadow economy of Cyprus using both extended annual data and quarterly data using for instance, indirect (macro) approaches such as the Electricity Consumption Method of Kaliberda and Kaufmann (1996) including the Modified Electricity Consumption Method of Eilat and Zinnes (2002) and the Currency Demand Approach of Tanzi (1980, 1983). The results from these methods would be compared with other methods and existing recent results for the Cyprus economy (e.g. Schneider, 2013, 2017). Secondly, to examine the impact of financial crises on the shadow economy in Cyprus. The novel contribution of this study is the investigation of the shadow economy in Cyprus before, during and after of two different local financial crises; stock market bubble burst in 1999 and banking financial crisis in 2013. There is a number of studies worked in a similar direction (Bitzenis et al., 2016; Colombo et al., 2016; Schneider, 2010; Buehn and Schneider, 2013). For instance, Buehn and Schneider (2013) show that the shadow economy increases after the world financial crisis in the countries under investigation (e.g. Canada, Chile, Norway). Consistent with Buehn and Schneider (2013) findings is the Schneider (2010) study which shows that by the beginning of the global economic crisis the shadow economy rose in all 21 OECD countries that are examined. In our study we plan not only to assess the impact of financial crises on the size of the

underground economy in Cyprus and compare it to other countries (mainly European), but also to examine whether the two different in nature financial crises have affected differently the size of the underground economy.

References

Bitzenis, A., Vlachos, V., Schneider, F., 2016. *An Exploration of the Greek Shadow Economy: Can Its Transfer into the Official Economy Provide Economic Relief Amid the Crisis?*. In *Journal of Economic Issues*, 165–196. <https://doi.org/10.1080/00213624.2016.1147918>

Buehn, A., Schneider, F., 2017. *Shadow Economy: Estimation Methods, Problems, Results and Open Questions*. *Open Econ.* 1, 1–29.

Buehn, A., Schneider, F., 2013. *Shadow Economies in highly developed OECD countries: What are the driving forces?* *Econ. Work. Pap.* 1–31.

Colombo, E., Onnis, L., Tirelli, P., 2016. *Shadow economies at times of banking crises: Empirics and theory*. *J. Bank. Financ.* 62, 180–190. <https://doi.org/10.1016/j.jbankfin.2014.09.017>

Duygun Fethi, M., Fethi, S., Turan Katircioglu, S., 2006. *Estimating the size of the Cypriot underground economy: A comparison with European experience*. *Int. J. Manpow.* 27, 515–534. <https://doi.org/10.1108/01437720610690464>

Eilat, Y., Zinnes, C., 2002. *The shadow economy in transition countries: Friend or Foe? A policy perspective*. *World Dev.* 30, 1233–1254. [https://doi.org/10.1016/S0305-750X\(02\)00036-0](https://doi.org/10.1016/S0305-750X(02)00036-0)

Georgiou, G.M., Syrichas, G.L., 1994. *the Underground Economy : an Overview and Estimates for Cyprus*. *Cyprus J. Econ.* 7.

Kaliberda, A., Kaufmann, D., 1996. *Integrating the Unofficial Economy into the Dynamics of Post-Socialist Economies: A Framework of Analysis and Evidence*. *World Bank, Policy Res. Work. Pap. Ser.* 1691, 1996, No. 1691. <https://doi.org/10.1596/1813-9450-1691>

Pashardes, P., Polycarpou, A., 2008. *Income Tax Evasion, Inequality and Poverty*. *Cyprus Econ. Policy Rev.* 2, 37–49.

Schneider, F., 2016. *Estimating the size of the shadow economies of highly-developed countries: Selected new results*. *CESifo DICE Rep.* 14, 44–53.

Schneider, F., 2010. *The influence of the economic crisis on the shadow economy in Germany, Greece and the other OECD countries in 2010: What can be done*. *Institute of Economics, Johannes Kepler University of Linz*.

Schneider, F., Dell'Anno, R., 2003. *The shadow economy of Italy and other OECD countries: what do we know?*. *Journal of public finance and public choice*.

Smith, P., 1994. *Assessing the size of the underground economy: The Canadian Statistical Perspectives*, *Canadian Economic Observer*.

Tanzi, V., 1983. *The Underground Economy in the United States: Annual Estimates, 1930-80. Staff Pap. - Int. Monet. Fund* 30, 283. <https://doi.org/10.2307/3867001>

Tanzi, V., 1980. *The underground economy in the United States: estimates and implications. PSL Q. Rev.*

5. Income under-reporting and the shadow economy: What does the HFCS suggest for Cyprus and the euro area?

E. Andreou, G. Papadopoulos and G. Syrighas

The shadow economy, as its name suggests, is an elusive phenomenon to study since -by definition- individuals associated with it try to keep the related activities undisclosed and/or their outcome misreported to the relevant authorities. This ambiguity is also reflected in its definition; one of the broadest definitions used in the economic literature defines the shadow economy as "those economic activities and the income derived from them that circumvent government regulation, taxation or observation" (Dell'Anno, 2003; Feige, 2007). One narrower definition of the shadow economy includes market based, legal production of goods and services that should be reported and taxed but are not (Pissarides & Weber, 1989).¹

The importance of having a measure of the size of the shadow economy and a measure of the associated tax evasion has resulted in a large literature employing various methods to estimate it. These methods can be classified in two broad categories; direct (micro) and indirect (macro) approaches. The first class includes the discrepancy method (Gyomai & van de Ven, 2014), representative surveys (Feld & Larsen 2005, 2008, 2009; Zukauskas & Schneider, 2016), surveys of company managers (Putnins and Sauka, 2015; Reilly and Krstic, 2017) and the estimation of the consumption-income-gap of households (Pissarides & Weber, 1989). The second class includes the discrepancy between national expenditure and income statistics (MacAfee, 1980, Yoo & Hyum, 1998), the discrepancy between official and actual labor force (Contini, 1981; Del Boca, 1981; O'Neil, 1983), the electricity approach (Kaufmann & Kaliberda, 1996; Del Borga & Forte, 1982; Portes, 1996; Jonson et al., 1997), the transaction approach (Feige, 1979; Boeschoten & Face, 1984; Langfeldt, 1984), the currency demand approach (Schneider, 2010; Vuletin, 2008; Williams & Schneider, 2016), Multiple Indicators Multiple Causes model (MIMIC) (Frey et al., 1984; Schneider et al., 2010; Hassan et al., 2016, Buehn et al., 2009).

In the case of Cyprus, several studies have tried to provide an estimate of the size of its shadow economy. Pashardes and Polycarpou (2008) used household survey data to estimate income under-reporting in Cyprus. Their results suggest that income under-reporting is approximately 7% to 8% of GDP. Fethi et al. (2005) employed monetary and non-monetary methods in the period between 1960 and 2003, estimating the Cypriot underground economy to be about 9.5% of GDP. Georgiou and Syrigha's (2004) application

¹ For a recent review of the literature see Schneider & Buehn (2018) and references therein.

of the currency approach for the period 1960-1990 yielded a range for the shadow economy's share of GDP of 2.7% - 10.3%. More recently, Schneider (2018) using the MIMIC approach estimated the size of the shadow economy in Cyprus for 2017 to be about 15% of its GDP.

This study aims to estimate the income misreporting by applying and extending the Pissarides and Weber (1989) (henceforth PW) method using the data from the Household Finance and Consumption Survey (HFCS) for Cyprus and potentially other European countries. Interestingly the HFCS covers waves before and after the recent global economic crisis as well as the Cyprus banking crisis and this angle of analysis has, to the best of our knowledge, not been considered in the literature. Some preliminary findings following the Pissarides and Weber (1989) approach using the Cyprus HFCS data, suggest that self-employed households in Cyprus under-report their income by about 32% and 22% in 2009 and 2013, respectively. Furthermore, the rich structure of the HFCS provides the information to extend the PW approach to households' wealth in addition to food expenditures.² The rationale behind this is that, if food expenditure is expected to be a concave function of income, then it might be less informative for households at the right end of income distribution. On the contrary, wealth could be linearly related to income, thus yielding more informative results at the top of the distribution. Moreover, given that this survey is a European panel survey that uses a harmonized methodology and definitions, it allows us to extend the analysis to the euro-area level. Hence, the panel dimension of the HFCS dataset could give important and policy-relevant results on the effect of the most recent financial and economic crisis on households' consumption habits.

Selected references

Feldman, N. E., & Slemrod, J., 2007. Estimating tax noncompliance with evidence from unaudited tax returns. The Economic Journal, 117, 327-352.

Feige, E. L. (Ed.), 2007. The underground economies: Tax evasion and information distortion. Cambridge University Press.

Schneider, F., & Buehn, A., 2018. Shadow economy: Estimation methods, problems, results and open questions. Open Economics, 1, 1-29.

Pissarides, C. A., & Weber, G., 1989. An expenditure-based estimate of Britain's black economy. Journal of public economics, 39, 17-32.

² In a study similar in spirit, Feldman & Slemrod (2007) focused on the relationship between reported charitable contributions and reported income from wages and salaries.

6. Survey-derived proxies for uncertainty: the case of Cyprus

C. Anaxagorou, S. Andreou and N. Pashourtidou

The recent global financial crisis has spurred interest in measuring economic uncertainty and assessing the impact of uncertainty on economic activity, employment and other macro variables. A wide range of uncertainty proxies has been proposed in the literature, for example: stock market volatility, forecast disagreement among professional forecasters (measured by the standard deviation of point forecasts), the frequency of words relating to uncertainty in newspaper articles, and the conditional volatility of the unforecastable component of a variable, computed across a large number of macro and financial series (e.g. Bloom, 2014; Baker et al., 2016; European Central Bank, 2016; Jurado et al., 2015). Other uncertainty proxies that have attracted the attention of researchers are those derived from Business and Consumer Surveys (e.g. Arslan et al. 2015; Bachmann et al., 2013; Girardi and Reuter, 2017). Data from Business and Consumer Surveys contain information on perceptions and expectations of economic agents (firms and consumers) on a range of economic variables at the individual and macro level. Business and Consumer Survey data can therefore be used to compute uncertainty proxies in the following two forms: (i) ex ante disagreement, using the percentages of optimistic and pessimistic responses to expectation questions, and (ii) ex post forecast errors, by comparing expectations and realisations stated by individual respondents (Bachmann et al., 2013).

As a producer of Business and Consumer Survey data for Cyprus, the Economics Research Centre carries out evaluations of different aspects of the survey data. The purpose of this project is to investigate the usefulness of uncertainty proxies derived from the Business Survey data as indicators of activity and employment fluctuations. Specifically, the proxies (i) and (ii) mentioned above will be constructed from the Business Survey data for Cyprus. The proxy based on ex post forecast errors (ii) exploits the individual (micro) firm responses and the panel nature of the Cypriot survey data available at the Centre. 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. Uncertainty proxies can be constructed by computing the cross-sectional standard deviation of firms' forecast errors (and the cross-sectional average of absolute forecast errors). The proxies based on ex post forecast errors from individual firm data will be compared to proxies based on ex ante disagreement constructed from the aggregate percentages of optimistic and pessimistic replies to forward looking questions. Both types of proxies can be constructed for the different sectors covered in the surveys and for the economy as a whole, by applying population weights.

The statistical properties of the two types of uncertainty proxies will be investigated (volatility, skewness, kurtosis, autocorrelation). Moreover, the dynamic relationships: (a) between the two types of proxies, and (b) between uncertainty proxies and hard indicators

(e.g. activity, employment), will be explored using descriptive statistics and VAR models. The ability of the survey-based proxies to forecast fluctuations in sectoral and aggregate activity will also be evaluated and compared to the forecasting performance of other survey-based leading indicators.

The project is expected to provide conclusions on the information content of business survey data for the level of uncertainty in the Cypriot economy, and whether changes in the level of uncertainty significantly impact on activity and employment. Empirical findings for other countries show that business and consumer surveys can be used to derive meaningful proxies for the level of uncertainty in the economy (e.g. Arslan et al., 2015; Bachmann et al., 2013; Girardi and Reuter, 2017).

References

Arslan, Y., Atabek A., Hulagu T. and Sahinoz A., 2015. Expectation errors, uncertainty, and economic activity. Oxford Economic Papers, 67(3), 634 - 660.

Bachmann, R., Elstner, S. and Sims, E.R., 2013. Uncertainty and economic activity: Evidence from business survey data. American Economic Journal: Macroeconomics, 5(2), 217-49.

Baker, S.R., Bloom, N. and Davis, S.J., 2016. Measuring economic policy uncertainty. The Quarterly Journal of Economics, 131(4), 1593-1636.

Bloom, N., 2014. Fluctuations in uncertainty. Journal of Economic Perspectives, 28(2), 153-76.

European Central Bank 2016. The impact of uncertainty on activity in the euro area. Economic Bulletin Issue 8.

Girardi, A. and Reuter, A., 2016. New uncertainty measures for the euro area using survey data. Oxford Economic Papers, 69(1), 278-300.

Jurado, K., Ludvigson, S.C. and Ng, S., 2015. Measuring uncertainty. American Economic Review, 105(3), 1177-1216.

7. Constructing productivity indicators

N. Empora and 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. Data for the construction of the aforementioned indicators will be collected annually and the estimated productivity indicators will be presented in an annual report so that there is 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.

Productivity Analysis Bulletin. Available at: <http://ucy.ac.cy/erc/en/publications/productivity-analysis>

8. Cyprus' competitiveness: IMD World Competitiveness Yearbook 2020

S. Andreou, N. Empora and N. Pashourtidou

The Economics Research Centre (CypERC), together with the Cyprus Employers and Industrialists Federation (OEB), acts as a Partner Institute of the IMD World Competitiveness Center for the 2020 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. OEB will collaborate with the IMD in the distribution of the opinion survey to business executives in Cyprus.

The results in the World Competitiveness Yearbook are sent to partner institutes before their release for preparing 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. The results on digital competitiveness for Cyprus are analysed in the CypERC Newsletter.

More information on the project available at: <https://www.imd.org/wcc/world-competitiveness-center/>

9. New developments in the social safety network and minimum wages in Cyprus.

L. N. Christofides

The Guaranteed Minimum Income (GMI) programme, established in 2014, introduced major changes to the social safety network (SSN) of Cyprus. It rationalised and replaced a number of ad hoc SSN programmes (including the previous public assistance programme), it introduced standardised eligibility criteria, and made aid conditional on labour market participation. Existing SSN contributory programmes, such as Unemployment Insurance (UI), continue to function as previously but the UI income is noted in the GMI entitlement calculations, reducing support from this new programme. However, if the individual's household needs exceed UI income then GMI payments may be drawn, bringing the household up to the minimum income level needed for its circumstances. The introduction of the GMI was instrumental in ameliorating hardship during the period of the Cyprus crisis. As more normal economic conditions return, it is useful to examine how the GMI dovetails with other SSN programmes, such as UI, a theme initiated in Christofides and Koutsampelas (2018).

A further initiative that is currently unfolding stems from the commitment to consider the introduction of a national minimum wage system. This commitment originated with the acceptance, by all 28 member states, of the 2017 European Pillar of Social Rights. The European Pillar of Social Rights (European Commission, 2017) suggests that "Adequate minimum wages shall be ensured, in a way that provide for the satisfaction of the needs of the worker and his / her family in the light of national economic and social conditions, whilst safeguarding access to employment and incentives to seek work. In-work poverty shall be prevented." It should be noted that the provisions of the Pillar were echoed in the 2017 election manifesto of the current president; it included the statement that "Once conditions of full employment are achieved, a dialogue will begin for the adoption of the national minimum wage in all occupations" (author's translation from Greek of this passage in 'Η Κύπρος της Νέας Εποχής').

Given this momentum, it is not surprising that discussions spearheaded by the Ministry of Labour, Welfare and Social Insurance appear to have led to an extension of the current system of wage minima that exist only in the non-unionised sector. A collective bargaining agreement was concluded in August 2019 for the unionised hotel sector. Among other things, it provides for the incorporation of legally binding minimum wages for a number of low-skill occupations in the sector. The total package has not been released, it will be spelled out in a proposal by the Minister, and be brought to the negotiating table for approval. However, its main features have already been accepted by the negotiating teams of the relevant unions and employer organisations. They will need to be ratified by their membership but the degree of support expressed by all parties involved suggests that the Minister's proposal will be endorsed. This development, if concluded as planned, will extend for the first time, legally binding arrangements that exist in the non-unionised sector

for a limited number of occupations to the unionised sector and the hotel sector in particular.³

Clearly, this extension from the non-unionised to the unionised sector does not amount to a national minimum wage system. It will add another ten or so occupations to the nine which are currently subject to the statutory minima mentioned above. But it will exclude workers in other sectors where low wages prevail and will clearly not cover highly paid occupations. The pros and cons of wage minima have been debated at length. Empirical findings which suggest that the effect of the imposition of a minimum wage on employment is not unambiguously negative have led to the application of monopsony theory to this context. Search and matching models have also been employed to analyse the effects of wage minima. And empirical studies have enriched the set of employment results (see Brown and Hamermesh, 2019), but also considered other margins, such as the impact of a minimum wage increase on product prices and profits - see Harasztosi and Lindner (2019). Freeman (1996, p. 639) describes the minimum wage as "...a 'risky' but potentially 'profitable' investment in redistribution", stressing that the usefulness of the minimum wage as an instrument for redistribution depends on the provisions of the SSN in a country.

This holistic approach, which encompasses study of the GMI, other SSN programmes such as the UI system, the existing structure of wage minima in the non-unionised sector, the 'indicative' starting salaries by occupation in the unionised sector, the plans for a national minimum wage, and the recent steps taken in the unionised hotel sector, has not been used in the context of the labour market of Cyprus. So, the proposed discussion paper will begin with a process evaluation of the current web of programmes (GMI, UI, statutory minimum wages and indicative wage minima in the unionised sector). Using EU SILC and Family Expenditure Survey data for Cyprus, wage distributions will be constructed with the view to assessing the mass of individuals who are subject to the statutory minima or might come to be covered by them under different future scenarios. In light of these findings, the paper will comment on the meaning of the national minimum wage notion and provide a road map for meeting the strictures of the European Pillar of Social Rights. The paper will be submitted to a refereed journal for possible publication.

References

Brown, C.C. and D.S. Hamermesh., 2019. Wages and hours Laws: What do we know? What can be done? IZA DP No. 12410. Available at <http://ftp.iza.org/dp12410.pdf>

³ The latest provisions are described in MLWSI (2012) and include *monthly* minima for shop assistants, clerks, child care workers and personal care workers and *hourly* minima for security guards and cleaners. In the unionised sector, there are no statutory minima and collective bargaining agreements are not legally binding. However, 'indicative' starting salaries for some 180 occupations are specified; the role of these in shaping a national minimum wage architecture needs to be explored.

Christofides, L. N. and C. Koutsampelas., 2018. *Aspects of the social protection system in Cyprus: A process evaluation*. Forthcoming, *Cyprus Economic Policy Review*. Also available at: http://www.ucy.ac.cy/erc/documents/DOP_07-18.pdf

Election Manifesto, 2017. 'Η Κύπρος της Νέας Εποχής'.

European Commission, 2017. *European Pillar of Social Rights*, pdf booklet, available at: https://ec.europa.eu/commission/sites/beta-political/files/social-summit-european-pillar-social-rights-booklet_en.pdf

Freeman, R., 1996. *The Minimum Wage as a Redistributive Tool*. *Economic Journal*, 106(436), 639-649.

Harasztsosi, P. and A. Lindner., 2019. *Who Pays for the Minimum Wage?* *American Economic Review*, 109(8), 2693-2727.

Ministry of Labour, Welfare and Social Insurance., 2012. *New minimum wage order valid April 1, 2012*. <http://www.mlsi.gov.cy/mlsi/dlr/dlr.nsf/All/F039CE17CA09933AC2257A9300246936?OpenDocument>

10. Bank competition and interest rates in Cyprus

S. Clerides

For many years, both before but also after adoption of the euro, Cyprus stood out among European countries in having very high interest rates. For many years there was a legally mandated maximum lending rate of 9%, which was lowered to 8.5% in 1994 and to 8% in 1997. Deposit rates were set accordingly by the Central Bank. The liberalization of interest rates in 2001 led to a small gradual decline, but rates continued to be significantly higher than in other European countries until adoption of the Euro and the financial crisis. They have since declined significantly and are now more in line with rates in other countries.

This project has two objectives. First, to carefully document the above trends using data from a variety of sources. Average monthly interest rates are available from the Central Bank of Cyprus for the pre-euro period and from the European Central Bank for the euro period. Data at the bank level are harder to find, but we have identified at least one source of information, namely newspaper advertisements.

The second objective is to try and understand how fluctuations in interest rates may be linked to developments in the Cypriot economy in general and in the banking sector in particular. The period 2004-2008 is of particular interest, as this was a period of intense bank competition, including several new entrants, and massive credit expansion. We will interpret our findings in the context of the wider literature on competition and bank risk taking, such as Boyd and De Nicoló (2005) and Vives (2016).

References

Boyd, J., & De Nicoló, G., 2005. *The Theory of Bank Risk Taking and Competition Revisited*. *The Journal of Finance*, 60(3), 1329-1343. Retrieved from www.jstor.org/stable/3694928.

11. The link between secondary technical/vocational education and the labour market in Cyprus

M. Eliophotou

Upper secondary technical and vocational education prepares graduates for direct labour market entry, in an attempt to meet the needs of the economy for skilled labour. However, in Cyprus, the ability of secondary technical and vocational education to meet its goals is limited by several factors. These include the relatively low enrollment in technical/vocational secondary education in the country and the fact that it is not a popular option among high ability students. Based on Eurostat (2019a) data, in 2016, about half (49.3 %) of all upper secondary school pupils in the EU-28 followed vocational programmes. The corresponding figure for Cyprus was exceptionally low (16.7 %). However, there is very little research on technical/vocational education in Cyprus, especially in relation to its link to the labour market.

In an international context, the link between education and the labour market has been investigated in many countries. It is the focal point of many policy initiatives aiming to enhance the employability skills of graduates. Relevant research points to employability deficiencies and mismatches between graduates' educational credentials and the requirements of jobs (e.g. Allen & de Weert, 2007; Kashefpakdel, Newton & Clark, 2019). The European Union has expressed both concern and determination in relation to the employment of young people in Europe: "Quality education and training, successful labour market integration and more mobility of young people are key to unleashing all young people's potential and achieving the Europe 2020 objectives." (Eurostat, 2019b).

The aim of the proposed research is the investigation of the link between secondary technical/vocational education and the labour market in Cyprus. Specifically, we will investigate the following:

1. The employment of technical/vocational education graduates after graduation. An attempt will be made to identify problems faced by graduates in their transition from secondary school to the labour market, with emphasis on the degree to which the skills they acquired at school were useful and/or sufficient in relation to their employability. Employability in this context refers to the ability to not only acquire a job but to also be successful in a chosen occupation by utilising specific skills and competencies (Yorke, 2006).
2. Ways of addressing employability and skill mismatch problems of technical/vocational education graduates. Based on data collected from both experts and technical education graduates, we will propose measures that can enhance the link between technical/vocational education and the labour market, and improve the effectiveness of technical/vocational education in general.

Experts will include key personnel of the Department of Technical and Vocational Education at the Ministry of Education and Culture and other officials in the area of technical/vocational education.

References

Allen, J. & de Weert, E., 2007. *What do educational mismatches tell us about skill mismatches? A cross country analysis.* *European Journal of Education*, 42, 59-73.

Eurostat, 2019a. *Vocational education and training statistics.* Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Vocational_education_and_training_statistics&oldid=451347#Vocational_training_within_secondary_and_post-secondary_non-tertiary_education.

Eurostat, 2019b. *Youth unemployment.* Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Youth_unemployment#Young_persons.27_participation_in_the_labour_market.

Kashefpakdel, E., Newton, O. & Clark, J., 2019. *How are schools developing real employability skills?* Available at: <https://umipsychology.com/wp-content/uploads/2019/02/joint-dialogue-report.pdf>.

Yorke, M., 2006. *Employability in higher education: What it is – what it is not.* York, England: Higher Education Academy.

12. The phenomenon of overeducation in Cyprus

A. Kourtellos (with C. Charalambidou, A. Kyrizi and K. Petrou)

Overeducation is defined as a situation whereby an individual's level of education exceeds the educational requirements for one's job.⁴ In the last decades, European countries experienced increases in the supply of graduates following an expansion of higher education. This is especially true in the case of Cyprus that has undergone a number of educational reforms, mainly at a tertiary or higher education level which is where the great majority of overeducation is usually found.

To the extent that this increase in the supply of graduates is not accompanied by a subsequent increase in the demand, the labour market may not be able to accommodate this increasing wave of graduates. Some individuals may be forced to work in jobs where their qualifications are above the level required by the job which results in overeducation. On the other hand, surplus education can result from individuals acquiring more education than needed, to distinguish themselves from other graduates. This is especially true in countries like Cyprus where due to its economy's small size and the high numbers of well qualified labour there is a high level of competition for matched jobs. Given that educational investments constitute important decisions not only at the individual level, i.e. foregone

⁴ In the same context lies undereducation which describes a worker who is employed in a job requiring more education than he or she holds. A worker who holds an equal level of qualifications as required by their job is called adequately educated.

immediate income and actual expenses related to studying but also at the government level i.e. budgetary investments in education aiming towards economic development and growth, overeducation presents itself as an inefficient outcome.

Overeducation can have adverse effects on an individual, firm and society level. Firstly, overeducation has been found to have a lower income return compared to required education and is often described as carrying a wage penalty. In other words, overeducated workers are expected to earn less than adequately matched workers performing the same job (Duncan and Hoffman, 1981; Daly et al., 2000; Murillo et al., 2012). Overeducation has also been linked to lower job satisfaction (Allen and Van der Velden, 2001; McGuinness, 2006) suggesting that overeducation could potentially lead to lower output and lower worker, firm and consequently country-level productivity.

At a firm level, overeducation has been linked to a number of employee behaviours that lead to lower productivity levels like for example, heightend on-the job search and higher worker turnover (Alba-Ramirez, 1993). In other words, overeducated workers are expected to be more likely to search for a new job while employed and are also more likely to quit leading to losses in recruitment and training investments (McGuinness, 2006). Furthermore, surplus education and the underutilisation of resources can cause a fall in a firm's output as employees skills are not fully utilized (Tsang, 1987; McGuinness, 2006).

Lastly, from the society's perspective, overeducation is considered to be a waste of resources, given that human capital resources are not used efficiently. By investing in education, the government expects an increase in the country's productivity and economic development. However over-education could potentially prevent this from happening as tax revenues and government spending are wasted on underused education (McGuinness, 2006). In other words, the existence of this educational mismatch raises doubts about the efficiency of public investment and educational systems and calls for a reconsideration of educational policies.

For the purpose of the project we will use data from the European Union Statistics on Income and Living Conditions (EU-SILC) and the Programme for the International Assessment of Adult Competencies (PIAAC). EU-SILC was launched in 2003 and Cyprus participated from 2005 and onwards. EU-SILC micro-data refer both to individuals and to households. For Cyprus we have more than 168,000 individuals ($\approx 12,000$ per year) and 56,000 households ($\approx 12,000$ per year). The Survey of Adult Skills of the PIAAC was conducted between September 2011 and March 2012 and covered more than 4,500 individuals. Useful information from both sources are: income, education, occupation, and various demographic characteristics.

Using EU-SILC and PIAAC data we decompose the total number of schooling of an individual into required years of schooling, the number of surplus years above the required the level, and the number of deficit years of schooling (e.g., Duncan and Hoffman, 1981). Then we will estimate the Mincer's earnings equation on the latter three measures of schooling allowing

for random coefficients and a nonlinear function of experience to account for parameter heterogeneity. Furthermore, we examine the presence of overeducation for the rich vis-à-vis the poor using a standard decomposition framework as outlined by Oaxaca (1973) and Blinder (1973).

This paper will end with a number of policy implications and recommendations stemming from the empirical analysis of the data mentioned above.

References

Alba-Ramirez, A., 1993. Mismatch in the Spanish labor market: overeducation?. Journal of Human Resources, 259-278.

Allen, J., & Van der Velden, R., 2001. Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search. Oxford economic papers, 53(3), 434-452.

Blinder, A. S., 1973. Wage discrimination: reduced form and structural estimates. Journal of Human resources, 436-455.

Daly, M. C., Büchel, F., & Duncan, G. J., 2000. Premiums and penalties for surplus and deficit education: evidence from the United States and Germany. Economics of Education Review, 19(2), 169-178.

Duncan, G. J., & Hoffman, S. D., 1981. The incidence and wage effects of overeducation. Economics of education review, 1(1), 75-86.

McGuinness, S., 2006. Overeducation in the labour market. Journal of economic surveys, 20(3), 387-418.

Murillo, I. P., Rahona-López, M., & del Mar Salinas-Jiménez, M., 2012. Effects of educational mismatch on private returns to education: An analysis of the Spanish case (1995-2006). Journal of Policy Modeling, 34(5), 646-659.

Oaxaca, R., 1973. Male-female wage differentials in urban labor markets. International economic review, 693-709.

Tsang, M. C., 1987. The Impact of Underutilization of Education on Productivity: A Case Study of the U.S. Bell Companies. Economics of Education Review 6(3): 239-254.

13. Public debt thresholds: An analysis for Cyprus

C. Savva

Public debt became notorious in the European Union since the Papandreou announcement in 2009, in which the Greek government admitted that the country had published erroneous public debt figures, and the revised numbers showed that Greece held one of the largest debt piles in the world. More so, the country could not service it as it stood, and was forced to adjust its public finances using intense austerity measures, including a debt haircut, known as the PSI (Private Sector Involvement). For more details, see Xafa (2013).

The perils of Greece's public debt were not limited to the country. Soon enough (in 2011), Portugal was also forced to require a bailout, while the country's only way to get out of the

crisis was also marked by intense austerity policies. Like Greece, Portugal's austerity policy had significant effects on the well-being of its citizens, as even hospitals decreased elective stay days, most likely due to reduced capacity (Perelman et al., 2015).

The European debt crisis progressed, other countries, such as Ireland, Italy, Spain, and Cyprus, followed suit, as their public debt stock increased to unsustainable levels. In every country, austerity measures were implemented, notably when the economies were already in a slump, exacerbating the already tight economic environment. Given that it took the countries at least three years to successfully exit their assistance programmes, the toll austerity measures had on the citizens of each country was significant (Antonakakis and Collins, 2014).

Thus, after the whole of Europe has witnessed first-hand the perils of public over-indebtedness, the question which remains unanswered is simple yet highly important: how much debt is too much debt?

The answer which attracted the most attention was that of Reinhart and Rogoff (2010), who imposed arbitrary debt levels at 30%, 60%, and 90% of GDP, and found that debt ratios above 90% of GDP were related to negative growth rates. This was also injected into the policy sphere, with European Central Bank presentations also suggesting that the empirical literature supports a 90% threshold rule (Checherita-Westphal and Jacquinot, 2019).

However, as Herndon et al., (2013) showed, Reinhart and Rogoff (2010) conclusions were the result of "selective exclusion of available data, coding errors and inappropriate weighting of summary statistics lead to serious miscalculations that inaccurately represent the relationship between public debt and GDP growth among 20 advanced economies" (page 2). In general, the authors' conclusions refute the Reinhart and Rogoff's claim that the relationship between public debt ratios and GDP growth is negative.

On a similar note, Panizza and Presbitero (2013) comment that there is no paper that can make a strong case for a causal relationship going from debt to economic growth. Furthermore, the authors also suggest that the presence of thresholds and, more in general, of a non-monotone relationship between debt and growth is not robust to small changes in data coverage and empirical techniques. Still, as Eberhardt and Presbitero (2015) note, using a static, non-linear model, they find some support for a negative relationship between public debt and growth, but no evidence for a similar, or common for that matter, debt threshold across countries.

In a further study examining for a non-linear effect, Égert (2015a,b) finds that a tipping of about 20% GDP can be found, even though other possibilities, such as a 50% debt threshold is also found. For some countries including the United States, a nonlinear negative link can be detected at about 30% of GDP, while for others, no nonlinearities can be established. Finally, other papers find that strong threshold effects are only found on democracy,

implying that higher debt results in lower growth for countries in the low-democracy regime (Kourtellos et al., 2013).

In the euro area, Gómez-Puig and Sosvilla-Rivero (2017) use a sample of 11 countries (not including Cyprus) to find that there appears to be little relationship between debt and growth after the Stability Growth Pact ceiling of 40% to 50%. Still, the specification used in the study is not suitable for threshold analysis, given that the threshold level is arbitrarily selected.

Overall, the above short review has provided insights as to how much importance is placed on the debt-growth relationship, especially for policymakers. Despite the importance of identifying whether a debt-growth threshold exists, and whether the relationship changes, there has been no study which has examined this for Cyprus.

To this end, we propose the use of a Smooth Transition Conditional Correlation (STCC) model, proposed by Berben and Jansen (2005) and Silvennoinen and Teräsvirta (2005), allowing us to test for potential non-linearities in the relationship between public debt and growth. Furthermore, the framework allows us to test whether the STCC specification is an adequate one, against a constant conditional correlation model (CCC) as per Berben and Jansen (2005) and Silvennoinen and Teräsvirta (2009).

With regards to variables, we propose the use of GDP growth as the dependent variable. Furthermore, we intend to use the unemployment rate as the dependent variable, given the known relationship between the two (Okun's law), with the aim of capturing the business cycle dynamics which are unrelated to the change in public debt. Then, given that we aim to examine whether additional debt spending will have an impact on growth, we also include the change in debt which, if the threshold conjecture is correct, should have a different sign once the threshold is surpassed. Finally, with regards to the threshold variable, we will include the Cyprus debt-to-GDP ratio, in an effort to examine if and where a threshold may lie.

References

Antonakakis, N., and Collins, A., 2014. The impact of fiscal austerity on suicide: on the empirics of a modern Greek tragedy. Social science & medicine, 112, 39-50.

Berben, R.P. and Jansen, W.J., 2005. Comovement in international equity markets: A sectoral view. Journal of International Money and Finance, 24(5), 832-857.

Checherita-Westphal, C. and Jacquinot, P., 2018. Economic consequences of high public debt and lessons learned from past episodes. ECFIN Workshop, Brussels, 18 January 2018.

Eberhardt, M. and Presbitero, A.F., 2015. Public debt and growth: Heterogeneity and non-linearity. Journal of International Economics, 97(1), 45-58.

Égert, B., 2015a. Public debt, economic growth and nonlinear effects: Myth or reality?. Journal of Macroeconomics, 43, 226-238.

Égert, B., 2015b. *The 90% public debt threshold: the rise and fall of a stylized fact*. *Applied Economics*, 47(34-35), 3756-3770.

Gómez-Puig, M. and Sosvilla-Rivero, S., 2017. *Heterogeneity in the debt-growth nexus: Evidence from EMU countries*. *International Review of Economics & Finance*, 51, 470-486.

Herndon, T., Ash, M., and Pollin, R., 2014. *Does high public debt consistently stifle economic growth? A critique of Reinhart and Rogoff*. *Cambridge Journal of Economics*, 38(2), 257-279.

Kourtellos, A., Stengos, T., and Tan, C. M., 2013. *The effect of public debt on growth in multiple regimes*. *Journal of Macroeconomics*, 38, 35-43.

Panizza, U. and Presbitero, A.F., 2013. *Public debt and economic growth in advanced economies: A survey*. *Swiss Journal of Economics and Statistics*, 149(2), 175-204.

Perelman, J., Felix, S., and Santana, R., 2015. *The Great Recession in Portugal: Impact on hospital care use*. *Health Policy*, 119 (3), 307–315.

Reinhart, C.M. and K.S. Rogoff, 2010. *Growth in a time of debt*. *American Economic Review*, 100(2), 573-78.

Silvennoinen, A. and Teräsvirta, T., 2009. *Modeling Multivariate Autoregressive Conditional Heteroskedasticity with the Double Smooth Transition Conditional Correlation GARCH Model*. *Journal of Financial Econometrics*, 7(4), 373 -411.

Xafa, M., 2013. *Life after Debt: The Greek PSI and its aftermath*. *World Economics*, 14 (1), 81–102.

14. 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 2014-2019. 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, and the Impact Assessment of this Plan. During 2020, this activity will focus on the following topics:

1. Finalising the impact assessment of different energy and climate policy scenarios of Cyprus, including the economic and environmental effects of each scenario.
2. Assessing distributional impacts of these scenarios with the aid of an updated version of the model developed by Pashardes et al. (2014), which will include data from the most recent Family Expenditure Survey of Cyprus of the year 2015.
3. Expanding the methodology that was developed and published in 2019 for the cost-effectiveness analysis of policies and measures to reduce economy-wide greenhouse gas emissions in Cyprus at least cost. After having developed a constrained optimisation model for this purpose, we will analyse the societal costs of a variety of policy options with this model, including combinations of carbon

taxes with technological measures; and we will explore the implications of these policy options with a view to compliance of Cyprus with decarbonisation targets both for years 2030 and 2050.

References

Pashardes, P., Pashourtidou, N. and Zachariadis, Th., 2014. Estimating welfare aspects of changes in energy prices from preference heterogeneity. Energy Economics, 42, 58-66.

Deliverables 2020

Title	Type
Business and Consumer Surveys	Monthly Bulletin
Macroeconomic forecasts for Cyprus	(i) Quarterly Bulletin (ii) Sectoral forecasts (available to CypERC's sponsors) (iii) Report/ Economic Policy Paper
Survey of Health, Ageing, and Retirement in Europe (SHARE)	Report
The interconnection between financial crises and the shadow economy: The case of Cyprus	Economic Policy Paper
Income under-reporting and the shadow economy: What does the HFCS suggest for Cyprus and the euro area?	Economic Policy Paper
Survey-derived proxies for uncertainty: the case of Cyprus	Economic Policy Paper
Constructing productivity indicators	Bulletin
Cyprus's competitiveness: IMD World Competitiveness Yearbook 2020	Bulletin
New developments in the social safety network and minimum wages in Cyprus.	Economic Policy Paper
Bank competition and interest rates in Cyprus	Economic Policy Paper
The link between secondary technical/vocational education and the labour market in Cyprus	Economic Policy Paper
The phenomenon of overeducation in Cyprus	Economic Policy Paper
Public debt thresholds: An analysis for Cyprus	Economic Policy Paper
Long-term energy and environmental planning in Cyprus	Economic Policy Paper