ECONOMICS RESEARCH CENTRE

UNIVERSITY OF CYPRUS

Research Plan 2021

SOURCES OF FUNDING OF RESEARCH ACTIVITIES AT
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Sponsorships

Central Bank of Cyprus

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Central Bank of Cyprus 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	Associate Prof. N. Theodoropoulos
Mixed Data Sampling (MIDAS) models: Theory and Application	Research Promotion Foundation (RESTART 2016-2020, Excellence Hubs)	Prof. E. Andreou
New Results in Group Factor Models: Theory and Applications	Research Promotion Foundation (RESTART 2016-2020, International Collaborations Dual Targeting)	Prof. E. Andreou
Composite Leading Indicator	Hellenic Bank	Prof. E. Andreou
Economic Impact Assessment Study of the Recovery and Resilience Plan of Cyprus	Ministry of Finance	Prof. E. Andreou
2nd Cyprus Competitiveness Report	Cyprus Directorate General for European Programmes, Coordination and Development (DG EPCD)	Prof. S. Clerides
The Role of Social Identity on Preferences for Redistribution	Marie Sklodowska-Curie Individual Fellowships (SOCIENTITY_PR, Grant agreement: 894128)	Associate Prof. A. Kourtellos

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1. Whether and how to design and implement a national minimum wage in Cyprus in the post-Covid-19 world

L. N. Christofides

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." The vast majority of the member states in the EU have some form of a national minimum wage; Cyprus, Denmark, Finland, Italy and Sweden do not. The Pillar was agreed by all member states and it is not surprising that it became part of the political debate in many of them. In Cyprus, the 2017 election programme of the current President stated that, once full employment (generally considered to have been reached when the LFS unemployment rate in CY has fallen below 5 %) returns, a national minimum wage that would hold for all occupations should be considered. Whether a single figure, how it would be set, and how its level would relate to the Guaranteed Minimum Income (GMI) scheme and be adjusted over time and at times of crises were not discussed. The issue of a national minimum wage is kept alive in EU documents and finds its way into country assessments in the European Semester.

In Cyprus legally binding occupational minimum wages (EUR 870 upon hiring and EUR 924 after six months, plus hourly rates for cleaners and security guards), which had risen rapidly prior to the crisis, have been frozen since 2012. Minimum wage legislation applies to occupations (e.g. formal carers, cleaners, clerks, retail trade assistants, and security guards) which are not unionised. In the private unionised sector, collective bargaining agreements, which are not legally binding, contain so-called 'minimum indicative starting salaries' for about 180 occupations. These range from EUR 663 per month for assistant waiters, to EUR 1991 per month for head cooks. Indeed, an agreement was reached to implement starting salaries in hotels, but Covid-19 may have changed these plans and postponed their implementation. How might the existing minimum wage approach condition the idea of a national minimum wage?

As the vaccination process unfolds and, hopefully, the incidence of Covid-19 abates, the LFS unemployment rate should edge downwards, towards the 5% level, and the momentum for a national minimum wage may revive. In fact, this idea has been discussed more intensely since the Budget for 2021 was recently turned down by the House of Representatives. The questions raised in the previous two paragraphs will need to be addressed going forward. The collectively bargained indicative starting salaries in the private unionised sectors constitute a current record of freely bargained minima for about 180 occupations. They capture market forces at work which, if violated, could create labour market dysfunction for the occupations concerned. It is not likely that they can form the basis for a system of national minimum wages, even if grouped into coarse categories. They would have to

become legally binding and their enforcement across the entire economy would be extremely costly, and possibly unacceptable.

Binding minimum wages entail many redistributions. As instruments for poverty alleviation they are not as direct and targeted as a GMI. As support to groups with particular needs, they are not purpose-built and not sufficiently flexible. Going forward, it is important to ask what a national minimum wage seeks to achieve, who it may benefit and who it may hurt, whether these effects can be predicted with certainty, and whether a national minimum wage is the best means of achieving the desired objectives. If the national minimum wage is a good way forward, what form should it take and when should it be applied?

These and other relevant questions will be raised and discussed in the proposed paper. It is important to consider these issues drawing upon the vast academic literature that has emerged on the subject. It is anticipated that the final DP will be ready by the Fall of 2021.

A short list of some relevant references is provided below.

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2. Property expropriation and investment in human capital: Evidence from Cypriot refugees

S. Clerides and I. Pattas

One of the most important long-term effects of the displacement of people from their homes due to conflict is its impact on children's education. Several studies have shown that reduced access to education by refugee children has significant long-term effects on their educational attainment, earnings and other outcomes (for example, Ichino and Winter (2004), Kecmanovic (2013)). A competing hypothesis proposes that individuals who have experienced a loss of physical assets will be more likely to direct their subsequent investments to human capital rather than to physical capital, because the former cannot be expropriated. Brenner and Kiefer (1981) and Nakamura, Sigurdsson, and Steinsson (2016) report evidence in support of this hypothesis.

Our objective is to test this hypothesis for the case of Greek Cypriot refugees of the 1974 invasion of Cyprus. We will use data from the European Social Survey (ESS), which is carried out every two years in all European countries. In the 2018 ESS, participants were asked to declare whether they had property in the occupied part of Cyprus or whether their family had to abandon their home in the north of Cyprus. This allows us to identify Cypriots from refugee families. We will use this information to examine whether people from refugee families have different educational outcomes from their counterparts from non-refugee families. The relatively small sample (about 800 respondents) may not be sufficient for reaching robust conclusions, but any evidence would be useful given the importance of the topic.

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3. The effect of educational systems on differences in the performance of children of different socioeconomic backgrounds and on the improvement of their learning outcomes, with reference to Cyprus

M. Eliophotou and L. Kyriakides

Educational systems are expected to achieve excellent outcomes in various aspects of learning and in different subjects. However, results from the Program for International Student Assessment (PISA) show that 20% of young people in Europe do not possess basic mathematical skills and that a 15-year old student from a low socioeconomic background is 2,37 times more likely not to possess the basic skills in Mathematics compared to a student from high socioeconomic background. These findings point to the importance of educational systems which will be in the position to achieve the maximum possible learning outcomes for all students and at the same time reduce the effect of socioeconomic status (SES) of students on their learning outcomes. This constitutes a major policy objective in education and educational policy on an international level.

Consequently, the aim of education is two-fold. First, schools and teachers must be supported in such a way so that educational objectives are achieved. As a result, the effectiveness of an educational system, school or teacher can be assessed in relation to progress in terms of student achievement in cognitive, affective, psychomotor and meta-cognitive areas (dimension of quality). Second, it is important to consider that all students must be in a position to benefit from education and at the same time ensure that their learning outcomes are affected to the lowest possible degree from their SES. Thus, the effectiveness of educational systems, schools or teachers can also be assessed by the extent to which they can reduce differences in learning outcomes between students from different socioeconomic backgrounds (dimension of equity).

Nevertheless, teams of researchers have addressed the dimensions of quality and equity as competing dimensions and have supported different perspectives in relation to ways of addressing the "cost" of promoting one dimension as opposed to the other. This can be partly attributed to the fact that equity has not been clearly defined and no mechanisms for

the measurement of the effectiveness of educational systems, schools or teachers have been developed in relation to this dimension. Further research is necessary to investigate the extent to which the promotion of equity can be linked to an improvement in quality at the level of the educational system.

With the above in mind, the purpose of the proposed research is to investigate the relationship that exists between the dimension of quality and the dimension of equity at the level of the educational system through data from PISA. Specifically, the research aims at the following:

1) The investigation of the extent to which variables associated with economic prosperity can explain differences in student learning outcomes and also explain why some countries have better learning outcomes than others

   ➢ In order to achieve this research objective, we will conduct separate multilevel secondary analyses for countries which participated in the last two cycles of PISA (i.e. years 2015 and 2018) and we will take into account the following variables: GDP, GNI, GNP and SES (student level and aggregated score at country level).

2) The investigation of the extent to which educational systems which appear effective in relation to quality are also effective in relation to equity

   ➢ In order to achieve this research objective, we will measure the effectiveness of each country which participated in PISA 2015 in relation to the dimension of quality (through the use of multilevel regression analysis) and we will compare this with its effectiveness status in relation to the dimension of equity. We will then examine the relationship between the two measurements at the system level. The same comparison will also be made with the use of data from PISA 2018 (not only for testing the generalisability of our findings (replication study) but also for the measurement of changes in the effectiveness status of each country, as seen below).

3) The examination of the extent to which changes in the effectiveness of countries in relation to the dimension of equity can lead to the improvement of learning outcomes

   ➢ As regards this objective, we will utilize the data of the second analysis and we will identify changes in the effectiveness of countries in relation to the dimension of equity (from 2015 to 2018) so that we can examine whether these changes predict changes in the effectiveness of these countries in relation to the quality dimension (with the use of discriminant function analysis).

4) The investigation of the link between the two dimensions at the school level by conducting the appropriate analyses with the data of PISA, as they emerged from the relevant research in Cyprus (on the basis of previously mentioned analyses)

The research and analysis of the topic will highlight the need for the development of policies and the undertaking of initiatives for the promotion of equity in the Cyprus educational system. It is important to note that in Cyprus, there is a greater gap in the performance of

students of different socioeconomic backgrounds in relation to other European countries. Consequently, this research can help in the development of policies and measures that will promote equity in Cyprus.

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4. Sectoral demand-driven and supply-driven output and employment multipliers in Cyprus

E. Giannakis and Th. P. Mamuneas

This paper aims to analyse the inter-industry linkages and interdependencies in the economy of Cyprus. Input-output analysis is a quantitative technique for studying the interdependence of production sectors in an economy over a stated time period (Miller and Blair, 2009). Input-Output models have been extensively applied for policy impact evaluation, structural and technical change analysis (Giannakis and Bruggeman, 2017; Giannakis and Mamuneas, 2018). In this paper, the structure of the Cypriot economy is assessed on the basis of the latest available national Input-Output table for the year 2016

(Eurostat, 2021). Demand-driven and supply-driven sectoral multipliers are estimated to assess the economy-wide effect of a shock or stimulus in the local economic system. The demand-driven multiplier analysis results can guide policy makers for evaluating the economy-wide effects of investments in specific sectors of economic activity, while the supply-driven multiplier analysis can provide insights about the economy-wide impacts of negative exogenous shocks on the output of the economy. Preliminary results indicate that the shipping and the construction sector are the sectors with the highest backward linkages in the Cypriot economy.

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5. Health Shocks and Spousal, Labor Supply: An International Perspective

N. Theodoropoulos

Researchers and policymakers have long been interested in the economic well-being of individuals suffering from work-limiting health shocks. With advances in the application of panel data techniques, researchers have been able to document the dynamic, long-term impact health shocks have on workers, specifically focusing on earnings and income. An area receiving less attention is how the onset of work-limiting disabilities influences the labor market outcomes of the affected individual's spouse. This paper uses longitudinal data from the Survey of Health, Ageing and Retirement in Europe (SHARE) from 2004 to 2017 to study the relationship between labor supply and spousal health shocks.

Understanding the experiences of individuals who suffer work-limiting disabilities is important for learning of the changing nature of inequality (Haveman and Wolfe 1990). For instance, the onset of a work-limiting disability is associated with a permanent loss in labor earnings (Stephens 2001; Mok *et al.* 2008; Meyer and Mok 2019). Evidence suggests that even 10 years after onset, earnings remain 15%-24% below what they would have been in the absence of the disability. These losses translate into downward movements in the earnings distribution (Nagi and Hadley 1972). There is also evidence suggesting that the disabled suffer discrimination (Johnson and Lambrinos 1985).

While understanding the individual experiences of disabled workers is important, it is necessary to explore the impact that work-limiting health shocks have on affected workers'

spouses, particularly if programs designed to assist the disabled are to be designed efficiently. Given the financial distress caused by disability, it is reasonable for spouses to adjust their labor supply. Knowing the extent of this adjustment is necessary for understanding if the loss of the disabled worker's earnings is a permanent loss to family income or is offset by increased spousal earnings. Theory, however, does not provide a clear prediction as to the directional relationship between work-limiting health shocks and spousal labor supply.

On the one hand, the onset of a disability should increase spousal labor supply through the added worker effect. Here, the earnings of the affected worker constitute a portion of the spouse's non-labor income. Therefore, a permanent decline of a disabled worker's earnings translates into a permanent decline in spousal non-labor income, which should increase labor supply, assuming leisure is a normal good. The added worker effect may be amplified along three dimensions. First, a liquidity-constrained household that cannot borrow to insure against a permanent income shock may experience a large added worker effect. Second, if the affected worker needs to leave the labor force and loses employer-sponsored health insurance, then the spouse may face added pressure to labor supply to qualify for insurance. Finally, one spouse's home production time can serve as a substitute for the other's. If the disabled individual increases time spent in home production, then this will free up market-based time for the spouse.

On the other hand, it is possible for a work-limiting health shock to reduce spousal labor supply. This is particularly true if the healthy spouse needs to provide in-home care to the disabled individual. Additionally, work-limiting health shocks reduce workers' labor supply, which necessarily leads to an increase in time spent at home. If non-market-based time of one spouse complements the other's, then the disability should reduce spousal labor supply. Finally, it is possible that public assistance programs that provide financial aid to those who suffer from work-limiting health shocks crowd out spousal labor supply.

In this paper, we use 2004 to 2017 SHARE data to analyze the relationship between work-limiting health shocks and spousal labor supply. The SHARE data contain survey responses from individuals 50 years old and older across 28 European countries and Israel. On average, our results show a negative labor supply response to spousal health shocks at both the extensive and intensive margins. The magnitude of the response is similar across genders. Interestingly, substantial cross-country heterogeneity exists with regards to the decrease in the probability of labor force participation, whereas the decline in hours worked is relatively stable across countries, particularly for a husband responding to his wife's health shock.

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6. Electricity consumption and economic activity in Cyprus using an asymmetric cointegration technique

Chr. Savva

Since the work of Kraft and Kraft (1978) - who were the first to empirically examine the causal relationship between electricity consumption and economic growth - many studies have dealt with this issue in various countries and regions (see, inter alia, Abosedra et al. 2009; Apergis and Payne, 2010; Tang et al., 2013; Narayan and Prasad, 2008; Sadorsky, 2011).

In Cyprus, the energy system is heavily dependent on imported petroleum products with only marginal decreases recorded since 2005 (Koreneos et al.., 2005; Mirasgedis et al. 2004; Zervos etal.. 2004; Zachariadis and Hadjikyriakou, 2016). To our knowledge, estimates of the elasticity of electricity consumption to GDP in Cyprus have only been conducted by Zachariadis and Pashourtidou (2007), who show that the elasticity is greater than unity.

Fitting within this literature, we aim to test for the presence of a long-run relationship between electricity consumption and economic growth in Cyprus and then proceed to examine whether equilibrium deviations have a different degree of persistence when shocks are positive or negative. Following the estimation of the cointegrating relationship and the respective elasticities, we will apply the Enders and Siklos (2001) threshold adjustment methodology for the first time in the electricity-growth literature. To our knowledge, only Esso (2010) has provided econometric estimates based on a threshold cointegration framework, albeit not using the Enders and Siklos (2001) methodology.

The benefit of the methodology is that it allows the researcher to examine whether positive and negative shocks have a different degree of persistence with respect to the expected duration of equilibrium deviations. In other words, the Enders and Siklos (2001) methodology allows us to examine for possible differences in the equilibrium adjustment process, resulting from differences in the nature of the shock. Understanding whether such

distinctions exist can prove extremely useful both for policymaking and forecasting purposes.

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7. Peace Creation and Peace Diversion updated

C. Hadjiyiannis and I. Pattas

This paper revisits the investigation of the impact of Free Trade Agreements (FTAs) and Custom Unions (CUs) on bilateral Military Interstate Disputes presented in Hadjiyiannis et al. (2016). We extend the analysis in two ways. First, we incorporate new data from the Correlates of War Project released after the publication of that paper extending the time period under investigation by 10 years (2000-2010) which increases the sample significantly. We follow the same methodology, as Hadjiyiannis et al. (2016), to investigate the Peace Creation and Peace Diversion effects identified in the paper and confirm their results with the expanded dataset. Peace Creation is the decrease in the probability of conflict between two countries if they are part of the same Preferential Trade Agreement and Peace Diversion is the increase in the probability of conflict between members and non-members.

Moreover, we evaluate the impact on the probability of conflict between key players in the following hypothetical scenarios:

1) Interruption of the CU between Turkey and EU
2) "Hard" Brexit
3) CU between EU and Ukraine
4) FTA between U.S.A and China

We assume that all the aforementioned hypothetical scenarios took place in the year 2000 and we use the actual data from 2000 to 2009 to check how the likelihood of MID changes under the hypothetical scenarios. Each scenario is estimated independently of the other ones. We then calculate the difference between the predicted probability under each hypothetical scenario and the estimated probability under the actual status quo.

In the first scenario, we find that the interruption of the CU between EU and Turkey increases the probability of war between Cyprus and Turkey by 16% initially but this drops to about 2% after the year 2004 when Cyprus joined EU. For the same scenario the increase of the likelihood of conflict between Greece and Turkey is also around 16 % initially but eventually it converges to about 10%. Hard Brexit leads to an increase of the probability of dispute for the country-pairs U.K.-France and U.K.-Germany and at the same time decreases the probability of conflict between France and Germany. The signing of a CU between Ukraine and European Union increases the probability of conflict between Ukraine and Russia by 1,65% on average. Finally, a Free Trade Agreement between the US and China increases the probability of conflict between them initially but decreases the likelihood of conflict after 2004 as expected. Similar results apply for the couples China-South Korea and China-Japan.

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8. Forecasting economic activity using targeted predictors: the case of Cyprus

C. Anaxagorou, N. Pashourtidou

The use of large datasets for forecasting has spurred research on the effects of pre-selecting predictors on forecasting performance (e.g. Boivin and Ng 2006). The benefits of pre-selecting predictors on forecast accuracy are documented in a number of empirical studies (e.g. Bai and Ng 2008 for US inflation; Bullingan et al. 2015 for Italian GDP growth and its expenditure components; Caggiano et al. 2011 for GDP growth in large European countries and the euro area; Girardi et al. 2017 for GDP growth in the euro area) and provide the motivation for considering subsets of predictors drawn from large datasets. The subsets of predictors are selected using 'hard' and 'soft' thresholding methods (e.g. Bai and Ng 2008). Under hard thresholding, a predictor is chosen based on its statistical significance for the variable of interest (e.g. a test for the significance of the correlation coefficient between the predictor and the variable of interest). Hard thresholding methods do not take into account information in other candidate predictors and might result in selecting collinear series, i.e. indicators whose information content is very similar. Soft thresholding methods are algorithms that select predictors and perform shrinkage, i.e. reduce the size of the estimates associated with predictors that are not important for the variable of interest. Soft thresholding methods rank the predictors in order of importance with respect to the variable of interest (e.g. highest correlation) by taking into account the information in all the candidate predictors; therefore, they exclude highly correlated series. Widely-applied soft thresholding algorithms include the Least Absolute Shrinkage Selection Operator (LASSO) and the Least Angle Regression (LARS).

Previous research using data for Cyprus has shown that GDP and sectoral growth forecasts computed from a set of pre-selected predictors using hard thresholding (i.e. significant correlation with the dependent variables) are at least as accurate as the forecasts obtained using the full set of predictors (Pashourtidou et al. 2018). Building on previous work, the proposed paper will apply hard and soft thresholding methods (e.g. LARS) on a large dataset of domestic and foreign series to pre-select informative predictors for forecasting the growth rate of GDP and its production-side components. The subsets of predictors will be allowed to differ across the various variables to be forecasted, as well as over the forecast horizon. The performance of component and aggregate growth forecasts computed from the smaller sets of predictors will be compared to that of forecasts constructed using the full dataset. As some of the sectors of economic activity (e.g. construction, financial services) are associated with high volatility, in terms of output growth, using a set of targeted predictors (by excluding noisy ones) is expected to better address the idiosyncratic features

of the sectors and to improve the forecasting performance at the sectoral level. The paper will determine which series are associated with the highest information content with respect to total and sectoral growth, and whether focusing on these series for forecasting generates significantly higher gains vis-à-vis a larger set. Therefore, conclusions about the usefulness of various groups of leading indicators (e.g. survey data, financial indices, hard data) for different forecast horizons will be drawn. Moreover, narrowing down a large database to a smaller set of monthly predictors could result in a computationally fast tool for computing monthly updates of the quarterly forecasts.

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

E. Andreou, T. Kaourma, G. Papadopoulos and G. Syrichas

Income under-reporting estimates based on households data and the size of the shadow economy are of interest to academics and policymakers. For that purpose, various methods have been developed using micro/survey data as well as aggregate/macro data. For a survey of the literature, the methods employed, and their strengths and weaknesses, the recent studies by Schneider (2014) and Schneider and Buehn (2018), among others, provide excellent references.

For Cyprus in particular, several studies have estimated income misreporting and the size of its black economy. Recent studies by Medina and Schneider (2018) using the MIMIC approach estimated the size of the shadow economy in Cyprus during the period 1991-2015 to be on average 31,3% of its GDP. In addition, in a recent study, Andreou, Andreou, Michael and Syrichas (2019) use macro methods for the period 1995-2018 to estimate the

shadow economy in Cyprus to be in the ranges of 13%-20% of the GDP following the currency demand method and 26%-34% of GDP according to the energy consumption approach.

An earlier study by Pashardes and Polycarpou (2008) applied the Pissarides and Weber (1989) approach to estimate income under-reporting in Cyprus using the Household Budget Survey (HBS). Their results suggest that the self-employed income under-reporting was around 40%, corresponding to an approximate size of the shadow economy of 8% of GDP in 2003. An updated estimate of the income misreporting and the size of the shadow economy in Cyprus, using the Pissarides and Weber model, is provided by Andreou, Papadopoulos and Syrichas (2019). The latter paper utilises data from both the Household Budget Survey (HBS) as well as the Household Finance and Consumption Survey (HFCS), given that both of these surveys were conducted in the same year in Cyprus and provide similar yet complementary information on households. The survey wave of 2009 has been used since it is common in both databases, thus allowing the comparison and cross-checking of the results. Also, using data for 2009 is guided by the fact that the impact of the crisis of 2012/13 that hit Cyprus could bias the results. The updated analysis for 2009 shows that income under-reporting had remained stable at least since 2002/3 when the study of Pashardes and Polycarpou (2008) estimated it to be in the range of 38% to 44%.

This study aims to extend the Andreou, Papadopoulos and Syrichas (2020) analysis to cover Cyprus and other European countries. Interestingly, the HFCS covers waves before and after the recent global economic crisis and the Cyprus banking crisis. To the best of our knowledge, this angle of analysis has not been considered in the literature. Furthermore, the rich structure of the HFCS provides the information to extend the PW approach to households' wealth in addition to food expenditures.[1] 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 the income distribution. On the contrary, wealth could be linearly related to income, yielding more informative results at the top of the distribution. Moreover, given that this survey is a European panel survey that uses a harmonised 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.

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10. 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 2014-2020. During 2021, this activity will focus on the following topics:

Updating energy and climate policy scenarios of Cyprus up to 2030 and 2050 with a view to latest macroeconomic developments and recovery measures, including the economic and environmental effects of each scenario. As in previous studies (Zachariadis et al. 2020), these scenarios will be communicated to national energy and environmental authorities which will have to update the National Energy and Climate Plan of Cyprus which is submitted periodically to the European Commission.

Developing and implementing a multi-objective optimisation model for assessing cost-effective decarbonisation pathways of the Cypriot economy. This will build on established methodologies (e.g. Vogt-Schilb and Hallegatte, 2014) and expand previous research work (Sotiriou et al. 2019) in order to provide insights for policy options that can contribute to achievement of the country's long-term energy and climate policy goals.

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11. 2nd Cyprus Competitiveness Report

The first Cyprus Competitiveness Report (CCR) was published in 2019. It was prepared for the Cyprus Economy and Competitiveness Council (CECC) with funding from the European Commission Structural Reform Support Service (SRSS). The report relies on more than 150 statistical indicators to benchmark Cyprus competitiveness performance over time and against 12 countries as well as the European Union average. It covers a wide range of competitiveness areas and provides an objective and evidence-based picture of the competitiveness of the Cypriot economy.

The CECC has commissioned the University of Cyprus to prepare the 2nd CCR. The 2021 CCR will include updates of all statistical indicators included in the 2019 CCR. It will analyze the patterns and trends reflected in the indicators, with a special focus on changes or breaks in trends since the first edition. This will be particularly important in the aftermath of the pandemic, which has caused major disruptions in economic activity in Cyprus and most of the rest of the world. Additional indicators will be introduced as needed. The report will go beyond mere reporting of statistics. It will identify problem areas and analyze the reasons behind Cyprus's unsatisfactory performance in these areas. It will put forth recommendations for policy measures that will enhance the competitive position of Cyprus in the medium and long run.

12. Economic Impact Assessment of the Recovery and Resilience Plan of Cyprus

E. Andreou, N. Empora, E. Giannakis, T. Mamuneas, G. Syrichas, T. Zachariadis, A. Allayioti, V. Bozani and D. Pontiggia

Under the Recovery and Resilience Plan (RRP), Cyprus is expected to draw significant funds totalling around 1.2 billion euro over the period 2021-2026. Each EC member country is required to accompany the proposed RRP measures with an economic impact assessment study. In Cyprus this study is undertaken by the Economics Research Centre. The economic impact assessment from the implementation of the Cyprus RRP is evaluated via a comprehensive study which provides estimates of the short-, medium- and long-term macroeconomic effects of the RRP, focusing on the key indicators of GDP and Employment growth in Cyprus, among others, following the guidelines of the EC. The analysis adopts several complementary methods and techniques, the Production Function approach, econometric models, as well as an Input-Output framework in order to assess the impact of all the measures included in the Plan. Moreover, some of the above methods evaluate the impact of both investments and reforms in Cyprus economy.

13. Business and Consumer Surveys

M. Charalambous, E. Kalorkoti, N. Pashourtidou

The Economics Research Centre (CypERC) coordinates the conduct of Business and Consumer Surveys in Cyprus; the project is 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 analyses trends in consumer confidence shaped by consumers' opinions about the recent and future financial conditions of their households and economic conditions in the country. Moreover, measures of the level of uncertainty in the abovementioned sectors and among consumers are obtained through direct survey questions. In the second half of 2021, new questions on investment plans will be introduced in the Services and Industry surveys, replacing the current Investment Survey. Hence, the bi-annual investment analysis in the Bulletin will be extended to cover the services sector.

Other tasks to be undertaken include: (i) the compilation of confidence indicators for sub-sectors of services (accommodation and food, financial, other); (ii) the compilation of capacity utilisation indices for services and manufacturing, and (iii) the estimation of uncertainty proxies from different methods. These indicators are used as input to various bulletins and forecasting models, as well as for assessing the quality of the collected survey data.

14. Macroeconomic forecasts for Cyprus

C. Anaxagorou, C. Charalambous, E. Kalorkoti, 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

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. 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.

The forecasts at the sectoral level enrich the analysis at the aggregate level. The sectoral forecasts will be sent to the project sponsor on a quarterly basis.

15. The Cyprus Composite Leading Economic Index (CCLEI)

Elena Andreou, Magdalini Tofini, George Syrichas

The Cyprus Composite Leading Economic Index (CCLEI) is an index designed to provide early warning signals for the turning points of the Cyprus business cycles i.e., early evidence of the turns in the Cyprus economic activity on a monthly basis. Similar leading indicators are available for many other countries by the OECD and the Conference Board. This is the first time a leading indicator has been estimated for the Cyprus economy. The CCLEI has been developed using a model-based approach following Aruoba, Diebold, and Scotti (ADS) in 2009, which is also used by the Philadelphia Federal Reserve Bank for estimating the Business Conditions Index in the U.S. economy. The CCLEI is based on a variety of mixed-frequency stock and flow data which are available at higher sampling frequencies such as oil prices, electricity production and tourist arrivals and whose changes tend to lead the changes in the overall economic activity. The ADS model is estimated using the mixed sampling frequencies of weekly, bi-monthly and monthly frequencies of a small number of leading indicators. The leading indicators have been selected from a large set of local and

international leading indicators following a number of statistical tests to comprise the CCLEI. These are the Brent Crude oil price, the euro area Economic Sentiment Indicator (ESI), the total property sales of contracts, the number of tourist arrivals, the value of visa card transactions, the retail trade sales turnover volume index, and the volume index of electricity production. The leading ability of these indicators is evaluated on a regular basis.

The CCLEI bulletin is published on a monthly basis since 12 of December 2019, estimating and commenting the monthly performance of the CCLEI based on the latest and revised data integrating the recent developments in the economic environment. The CCLEI has proved to be a reliable leading index of economic activity providing promptly signals to the policy makers, especially when macroeconomic conditions evolve rapidly and uncertainty dominates, such as in the recent period of the global coronavirus pandemic. The COVID-19 is not only a public health crisis, but it has also severely affected the global economy causing the largest global recession in history. Similarly, the recent literature Diebold (2020) highlights the importance of exploiting higher frequency information and real time data to track the rapid economic developments.

The CCLEI is a research project funded by the Hellenic Bank and the methodology as well as all monthly bulletins and report can be found at the following links:

➢ Monthly Bulletins
➢ Methodological Report

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16. Cyprus' competitiveness: IMD World Competitiveness Yearbook 2021

M. Charalambous, 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 2021 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 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 an opinion survey to business executives in Cyprus.

Partner institutes gain access to competitiveness results prior to the official publication in order to prepare press releases for the local media. The results of the competitiveness rankings for Cyprus will be analysed in a specialised Bulletin (in Greek) to be prepared at CypERC and will be circulated electronically to a large mailing list that includes the local media, policy makers, organisations, business, etc. The results on digital competitiveness for Cyprus will be analysed in the CypERC Newsletter.

17. Tourism prospects

M. Charalambous, N. Pashourtidou

The report, to be prepared on a quarterly basis, will analyse the results of a quarterly survey among firms providing tourist-related services in Cyprus, namely accommodation services (NACE Rev 2. code 55) and travel agencies, tour operators and related activities (NACE Rev 2. code 79). The report will analyse firms' assessments of the current levels of bookings from abroad compared to the same period in the previous year; the assessments relate to total bookings, as well as reservations by country of origin of tourists (United Kingdom, Russia, Germany, Greece). Firms' expectations regarding their total bookings from abroad for the year as a whole (to be asked in March, June and September) or the next year (to be asked in December) will also be discussed in the report. Previous surveys only collected qualitative responses with respect to assessments and expectations. As of March 2021, the survey will gather both qualitative and quantitative information on current and future trends in bookings. The quantitative responses in the form of year-on-year percentage changes are expected to give additional insights into the trends in tourist inflows in Cyprus, particularly as the negative impact of the pandemic on international travel has increased uncertainty surrounding the outlook of the domestic tourist sector.

The report will also present information about the main factors that affect bookings from abroad according to firms in the sample (e.g. the economic conditions in the country of origin, the availability of flights/connections to Cyprus, tourists' perceptions of the price-quality of the tourist product).

18. The Role of Social Identity on Preferences for Redistribution

Kyriakos Petrou, Andros Kourtellos

The goal of the action is to understand and uncover the role of social identity on the formation of preferences for redistribution. The fellowship will be carried out at the University of California, Los Angeles for 24 months and the University of Cyprus for 12 months. The research objectives of the proposed research are twofold: (1) Investigate the effect of social identity on preferences for redistribution and (2) Investigate the existence of multiple regimes and parameter heterogeneity on preferences for redistribution. The

fellowship will result in high-quality research and targeted policy papers to eliminate several negative social phenomena impacting the academic community, the Cypriot and European policymakers, and the general public.

19. Estimating the impact of online teaching on students' performance

Andros Kourtellos and Kyriakos Petrou

The sudden shift to remote and hybrid teaching since Spring 2020 due to COVID-19 has been challenging for both students and instructors. We have now concluded almost 3 semesters of online or hybrid teaching since March 2020 when the pandemic hit Cyprus and the university introduced changes in its learning system. In a recent study, Aucejo et al. (2020) and Supriya et al. (2021) use evidence from survey and administrative data to show large negative effects across many dimensions due to COVID-19such as delayed graduation. In this project we propose to study the impact on online teaching on the grades of the freshmen students at the University of Cyprus. The analysis will be based on administrative student records that include both grades, demographics, and admission grades. While our analysis will cover all freshmen students across the university, we will pay particular attention to the courses of the Department of the Mathematics and Statistics that enforced in-person exam taking. Our analysis will shed light on the following questions. Did the switch to online or hybrid learning have an impact on the grades of the freshmen students? Did the online or hybrid learning make the students more likely to fail a course? Was the effect different between Spring 2020 and the academic year 2020-21? Did it affect the female more than the male students?

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20. Constructing productivity indicators

N. Empora and Th. Mamuneas

Productivity developments play a central role 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. In this context the capital stocks for the following major investment categories of the economy will also be constructed: Information and Communication Technology (ICT), Research and Development (R&D), Infrastructure, Other physical capital and Human capital. Data for the construction of the aforementioned indicators and variables 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. Data will come mainly from Eurostat, the Statistical Service of Cyprus as well from the relevant literature.

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

Deliverables 2021

Title	Type
Whether and how to design and implement a national minimum wage in Cyprus in the post-Covid-19 world	Economic Policy Paper
Property expropriation and investment in human capital: Evidence from Cypriot refugees	Economic Policy Paper
The effect of educational systems on differences in the performance of children of different socioeconomic backgrounds and on the improvement of their learning outcomes, with reference to Cyprus	Economic Policy Paper
Sectoral demand-driven and supply-driven output and employment multipliers in Cyprus	Economic Policy Paper
Health Shocks and Spousal, Labor Supply: An International Perspective	Economic Policy Paper
Electricity consumption and economic activity in Cyprus using an asymmetric cointegration technique	Economic Policy Paper
Peace Creation and Peace Diversion updated	Economic Policy Paper
Forecasting economic activity using targeted predictors: 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
Long-term energy and environmental planning in Cyprus	Economic Policy Paper
2nd Cyprus Competitiveness Report	Report
Economic Impact Assessment of the Recovery and Resilience Plan of Cyprus	Report
Business and Consumer Surveys	Monthly Bulletin
Macroeconomic forecasts for Cyprus	(i) Quarterly Bulletin (ii) Sectoral forecasts (available to CypERC's sponsor)
The Cyprus Composite Leading Economic Index (CCLEI)	Monthly Bulletin
Cyprus' competitiveness: IMD World Competitiveness Yearbook 2021	(i) Data list (ii) Bulletin
Tourism prospects	Report
Estimating the impact of online teaching on students' performance	Economic Policy Paper
Constructing productivity indicators	Bulletin