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Summary

This study analyses demand, supply and price developments in Cyprus, in the run-up to its banking crisis and the early years of the recovery, analysing also new information on prices in levels. It further looks into alternative models to forecast house price inflation in Cyprus taking into account particular country characteristics and developments. Although there are many difficulties with this exercise, related to data availability, this analysis constitutes a first step in creating a database of relevant data and understanding the empirical correlation between potential explanatory variables and house prices trends. There appears to be a correlation between house prices and purchasing capacity, deposits, foreign sales, housing stocks, and NPLs. The presence of higher NPLs in particular appears to drag house prices down. High NPLs not only indicate credit tightening, but they also reflect pressure on households and businesses for real estate asset disposal as a mean to assist deleveraging, and therefore an ensuing increase in real estate supply.

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Introduction

Understanding the developments in the Cypriot housing market can help to better assess the country's adjustment after the crisis. This paper discusses demand, supply and price developments in Cyprus in order to shed light on the importance of this sector for the unwinding of imbalances in the financial and non-financial private sector. It further analyses the determinants of house prices in Cyprus, to help predict future developments, emphasising the impact of legacies from the crisis, particularly non-performing loans.

The Cypriot housing market was severely affected by the global financial crisis and subsequently by its own banking and sovereign debt crisis. Housing sales fell by 60% between the 2007 peak and 2009, as the global financial crisis unfolded. Still, sales to residents held up relatively well up to 2012, cushioned by a significant expansion of mortgage credit to Cypriot households. As credit expansion stalled in 2012, housing sales declined further. In 2015 housing sales amounted roughly to 20% of the 2007 peak.

The foreign segment of the housing market continues to be of importance to Cyprus despite its declining share in sales during the crisis. The crisis affected most significantly property sales to non-residents, which had doubled in size between Cyprus' EU membership in 2004 and the 2007 peak, according to data on registered sales contracts by nationality. With the global financial crisis, foreign sales dropped by more than 80%, and continued to fall further to stand at about 10% of their 2007 peak level in 2015. In 2016 this segment represented about 25% of the total market sales.

The combination of depressed sales and excessive stock accumulation led to a sharp fall in prices, a decline of about 30% between 2008 and 2015. In other European countries like Spain and Ireland the house price correction was even more pronounced (about 35% and 50% respectively) but it is difficult to compare the dynamics across countries due to catching-up effects and differences in the pre-crisis valuation. According to the central bank of Cyprus index of housing prices, published also by the ECB, house prices continued to fall in 2016, but at a more moderate pace (-1.4%), showing signs of recovery in 2017.

In the context of a high proportion of loans to households, developers and SMEs, which are secured by real estate wealth and are non-performing, the behaviour of house prices can be of key importance. In Cyprus a large proportion of loans is collateralised by real estate property. As the value of this collateral declined banks needed to scale up provisions for losses, particularly in the context of a high, even though declining, ratio of non-performing loans. Also, as property prices declined, incentives for strategic default increased among borrowers, especially when non-primary residences are at stake.¹ The recovery of collateral prices can increase the range of available restructuring options as it reduces the amount of "under-water" mortgages (i.e. with outstanding principal above the market value of the house), and facilitates asset disposal as a deleveraging tool for both households and businesses. It is important to note also that in Cyprus, loans to SMEs are often secured by households' real estate.

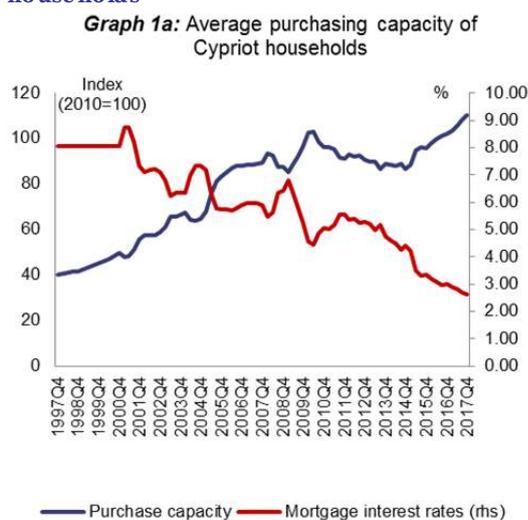
To help gauge the medium term prospects of this market in Cyprus, the remainder of this note discusses in more detail demand, supply and price developments since EU accession and proposes alternative models for house price forecasting focusing on the role of credit and non-performing loans in particular. Section 1 describes demand developments and the main variables affecting demand for housing; section 2 analyses supply developments; and section 3 discusses the ensuing price dynamics. In section 4 the paper proposes alternative models for house price forecasting in Cyprus and a method to combine forecasts given model uncertainty and small sample biases. Section 5 concludes.

Main demand developments

The average purchasing capacity of Cypriot households fell, in line with the reduction of disposable income during the crisis, but recovered somewhat since 2014, supported by a significant reduction in interest rates. The purchasing capacity of Cypriot households (see definition in Annex 1) increased significantly in the run-up to euro area accession in 2004, not only due to high annual rates of nominal GDP growth but also to the downward convergence of interest rates towards euro area levels (Graph 1). Between 2010 and 2014, as the sovereign debt crisis unfolded in Europe, the purchasing capacity of Cypriot

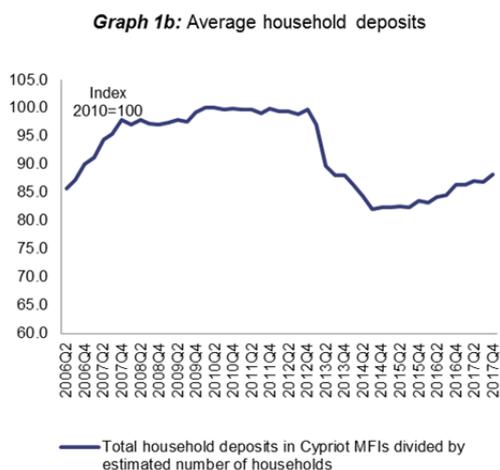
households fell, in line with low nominal growth and relatively high interest rates. The downward trend stalled in 2014 with a recovery initially aided by a reduction in interest rates and later supported by economic growth. Deposits, which are not included into the concept of purchasing capacity, but can be used as a proxy for savings, fell significantly between mid-2012 and 2014 but have since stabilised (Graph 2).

Graph 1: Average purchasing capacity of Cypriot households



Source: Eurostat, Central Bank of Cyprus and own calculations
 Note: Household disposable income is calculated using quarterly data on compensation of employees and the annual share of compensation in disposable income interpolated.

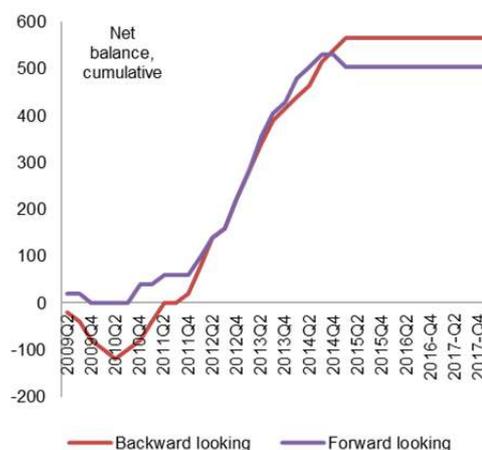
Graph 2: Average household deposits



Source: Eurostat, Central Bank of Cyprus and own calculations

The unemployment rate increased significantly with the crisis, from a pre-crisis rate of 4% to around 15% in 2015, and although it has receded it still remained close to 10% in 2017, with a relatively high incidence of young and long-term unemployment. Despite the fact that average purchasing power is recovering, this could be masking significant inequality among households, as unemployment can constrain the number of households able to obtain credit and buy or build a house, especially among the young. This problem, however, is mitigated in Cyprus by a high incidence of housing gifts, from parents to children, traditionally upon marriage, documented in previous Cypriot household surveys.² Housing gifts are also in line with the wide income dispersion among home owners in Cyprus, found in the more recent 2013 Household Finance and Consumption Network (HFCN) survey.

Graph 3: Credit standards on house purchases (supply)

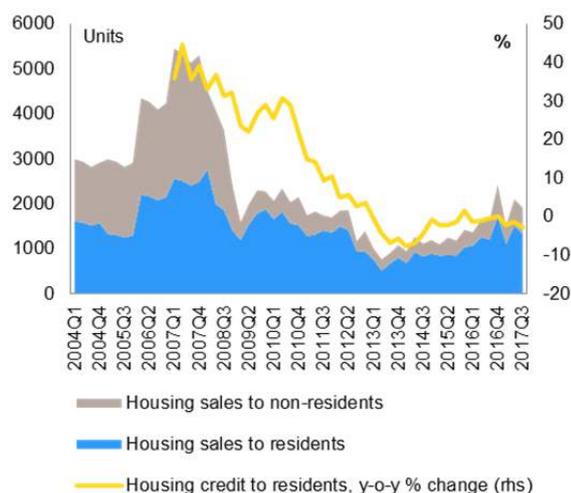


Source: European central bank lending survey. Data only available from 2009Q2.

Adding to the demand constraints, access to credit was significantly tightened, in view of the very high rates of non-compliance. Despite the significant reduction in lending rates, which has supported the purchasing capacity of households through the crisis, access to credit has been tightened in Cyprus, especially since end-2011, alongside a mounting ratio of non-performing loans. Although further tightening seems to have ceased, according to both backward looking and forward looking bank lending survey indicators, a significant relaxation has not yet been observed (Graph 3), leading to low flows of additional credit for housing purchases.³ This has inhibited the ability of liquidity strapped

households to purchase properties, despite reasonable income flows on average. As a result, housing sales to resident households fell, in line with the tightening of credit both in 2007-2008, with the global financial crisis, and in 2011-2013, with the sovereign debt crisis (Graph 4). Since 2015 sales have increased from very low levels, but according to the Cyprus developers' association a significant number of transactions were in cash and have also included debt-to-asset swaps between mortgage debtors and banks, with the number of new mortgages remaining very limited well into 2017 (Graph 4).⁴

Graph 4: Housing sales by residency and housing credit to residents

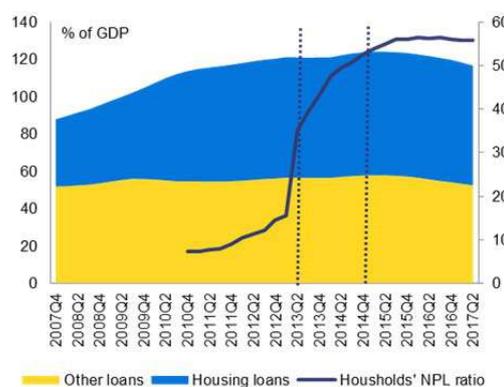


Source: Cyprus Ministry of Finance and Central Bank of Cyprus. Note: Sales data from 2004 to 2007 have been interpolated from annual data.

Low inflation depressed the growth of nominal GDP, slowing down the process of household deleveraging, which would help to rebalance the credit market. In Cyprus, housing loans to resident households represent about 50% of all bank loans to resident households, and about 80% of housing and consumer loans (excluding "other lending" to households). Up to 2013Q1, the stock of housing loans had been increasing on a continuous basis to reach about 66% of GDP. Since the second quarter of 2013, alongside the more significant tightening of credit supply conditions, the stock has started to fall, but due to moderate nominal GDP growth, households have not managed to reduce significantly their housing debt stock as a share of GDP (Graph 5). On this front, a return to moderate rates of inflation, which in the first seven months of 2017

has reached 1% after four years of consecutive decline, helps to support nominal incomes and accelerate the deleveraging process. Still, despite the accelerating growth, non-performing loans in the household sector remain very high (around 50% of total household loans in 2017). Private sector, non-performing loans (including households, see Graph 5) increased significantly as the crisis unfolded. Some of the increase was also due to a change in the definition of non-performing loans which became significantly stricter in 2013Q2, with another subsequent revision in 2014Q4.⁵

Graph 5: Bank liabilities of Cypriot Households



Source: Central bank of Cyprus and Eurostat. Note: dashed lines mark changes in the definition.

The non-resident segment of the housing market contracted significantly with the global financial crisis of 2007-2008 and, although sales started to increase from very depressed levels, the profile of buyers has changed. Sales of property to foreigners, which represented about 50% of total sales between 2004 and 2008, contracted from around 11 000 a year in 2007 to around 1 000 in 2013, while sales to locals contracted from about the same number in 2007 to a trough of close to 3,000 a year in 2013. Both segments experienced some recovery since, to annual values of around 1 800 and 5 250, for the foreign and local market respectively in 2016 (Graph 4), with the local market representing about 75% percent of the market in 2016. Housing loans to non-residents represented only about 11% of the total housing credit and have been on a declining trend since 2012Q2, with this decline having accelerated since 2015Q2. According to the authorities the profile of foreign buyers has changed since the crisis, with British buyers being replaced with buyers from Russia, Asia and the

Middle-East, who are attracted by residency permits offered by Cyprus under certain conditions that include the purchase of property. According to the developers association, transactions in this segment of the market since 2015 included an important number cash transactions and prices are relatively high due to the higher income profile of current foreign buyers.⁶

Problems related to the issuance and transfer of title deeds have the potential to deter investors and aggravate credit market distortions. There is an increased awareness among Cypriots and foreign buyers of the delays in issuing and transferring title deeds, and of the fact that many properties now available for sale may be encumbered by mortgages and/or memos from other creditors, including the State. A significant number of buyers in Cyprus, the so called “entrapped” buyers, have paid the full price for their properties but saw the transfer of the title to their names blocked by existing encumbrances on the property, which relate to developers loans and other debts, including tax debts. Introduced in 2015, the “trapped buyers’ law” was designed to protect trapped buyers by releasing the property they have purchased from the developer’s obligations to their lenders, enabling the buyer to obtain the title deed for the property.⁷ Further, a decree issued by the Interior Minister in 2016 authorises local authorities to excuse predefined planning irregularities on properties, making it this way possible to speed up the issuance of title deeds when no title had yet been issued.⁸ Still, some 34,000 title deeds were still pending issuance by mid-2017.⁹ More importantly, there is no effective system to guarantee that, in future transactions, the money paid by the buyer will be used to fulfil the obligations of the seller towards its lender and remove any encumbrances on the property, as there is no notary system in Cyprus as in other European countries.

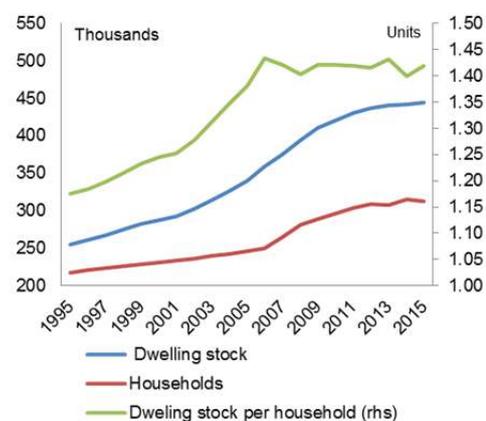
Rental yields remained relatively low despite the significant correction in prices, depressing the investment value of real estate. According to the Royal Institution of Chartered Surveyors (RICS)¹⁰, average gross yields in Cyprus in 2016Q4 stood at 4% for apartments, 2.1% for houses, 5.3% for retail, 4.4% for warehouses, and 4.6% for offices. The stabilisation in capital values and rents kept investment yields relatively stable but at low levels. Mortgage rates in Cyprus were well above 4% before March 2015 but have since declined to stand at around 3% in 2016. This means that local

borrowing to invest in an apartment to rent it out has only become a barely profitable investment in 2016, while the same type of investment on a house continued to be unprofitable. At the same time, foreign property investors with a view to rent are unlikely to be attracted by the Cypriot market at current yields, which according to RICS stand below overseas yields in 2016. This may be related to frictions in Cypriot house market (see Box 1) which may have maintained rental yields depressed on average.

Main supply developments

Between 2008 and 2011 the growth of the housing stock exceeded sales by significant amounts, creating an excess supply which could take time to be reabsorbed by the market. There are indicators of an accumulated excess supply of housing in Cyprus (Graph 6). Between 2004 and 2008 the housing stock grew rapidly and production took time to adjust to the sharp fall in sales in 2008 and 2009. Just taking the difference between the housing stock and sales between 2004 and 2015, an accumulated stock of about 10 000 dwellings can be identified, which at the construction/sales rate of 2015 will take up to 2018 to be absorbed by the market. Another indicator of a current excess supply comes from comparing the growth rate of the housing stock to the growth rate of the estimated number of households. This comparison indicates that dwellings per household increased by about 20% from 1995 to 2015, from 1.2 to 1.4.

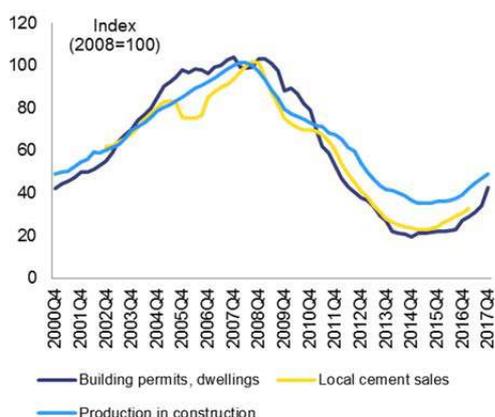
Graph 6: Housing stock and number of households



Source: Cystat and Eurostat. The number of households equals population divided by the average size of households. Before 2005 the average size of households was kept at the 2005 level due to unavailability of data.

In response to the excess supply of housing, construction activity contracted significantly following the peak in 2008, but construction output has started to recover. Activity in the construction sector has dropped by more than 70% between 2008 and 2015. The sector was the hardest hit by the crisis. Compared to other sectors, construction has the largest share of bank loans to total bank lending to nonfinancial corporations (about 28%), and has the highest ratio of non-performing loans (about 75%). Labour shedding in the sector was limited and profit margins have shrunk significantly.¹¹ Since mid-2015 the real GVA of the sector started to grow again, moderately. In addition, cement sales and building permits have also started to increase (Graph 7).¹²

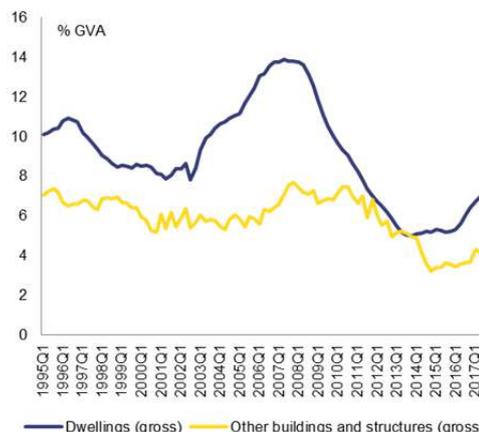
Graph 7: Indicators of housing supply



Source: Eurostat

Non-housing construction investment also fell significantly, especially since 2011 when credit tightening was more visible, and may remain constrained by the private and public debt overhang. Excessive debt works as a tax on investment as its returns have to be used to pay out old debt.¹³ This creates a disincentive for overleveraged borrowers to invest, while at the same time prevents them to earn more in the future and pay-off the debt. This is the so-called debt-overhang. As evidence of this effect, total investment in Cyprus fell from about 27% of GDP in 2008 to about 14% in 2015, and non-dwelling construction investment (other buildings and structures) fell from about 7% of gross GVA to about 4% in the same period (Graph 8).

Graph 8: Construction Investment by type



Source: Eurostat

House price developments

Alternative residential price indexes indicate that the market reached a turning point. There are three main indexes for Cypriot residential prices, the Eurostat index of residential prices (compiled by Cystat), the ECB index of residential prices (compiled by the Central Bank of Cyprus), and the RICS index of house prices (Graph 9). According to the Eurostat index, residential price inflation has been low but positive on average since 2014Q3. According to the ECB index, house price inflation continued to be negative until 2016Q1, but the pace of price decline has decelerated progressively since 2014Q3, to stand at around -1.6%. A similar pattern is shown by the RICS index, but the deceleration of the fall in prices has been faster according to this index, and in 2016Q1 prices were virtually stable (y-o-y inflation of 0.6% for houses and -0.2% for flats).¹⁴ All in all, indications are that prices hovered around a turning point in 2016-2017.

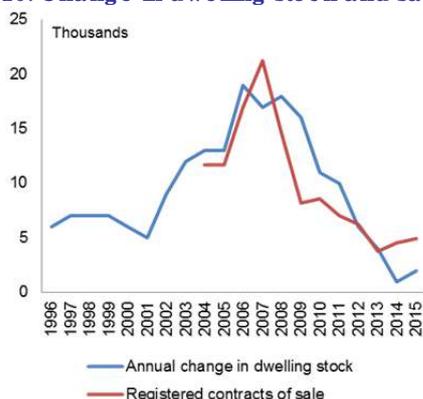
The closing down of the gap between new houses and sales is also indicative of a turning point. The ratio between new housing and sales is generally a good leading indicator of price developments as it points out a change in the balance of power between buyers and sellers, to the detriment of the former when the ratio is declining. In Cyprus this ratio increased significantly in 2008 and 2009 but started to decline since, approaching 1 in 2013, and going below 1 thereafter (Graph 10).

Graph 9: House price indexes, alternative sources



Source: Eurostat, ECB, RICS

Graph 10: Change in dwelling stock and sales



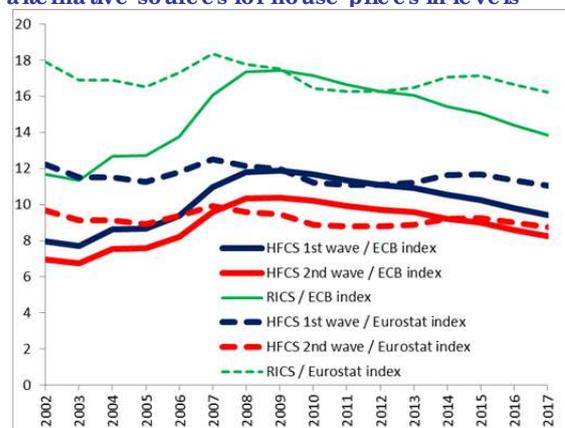
Source: Cystat and Eurostat.

Real house prices increased virtually as much as nominal prices up to 2008 but on the downward adjustment phase, they have been supported by a period of negative inflation. The deflator of private consumption is the variable generally used to deflate house prices. This deflator has been relatively stable in Cyprus. Since 2014 the negative growth in this deflator has kept the decline in real house prices contained. But this effect is winding down as the deflator stabilises. As inflation picks-up in Cyprus, the recovery of nominal house prices will have to accelerate in order for an increase in real terms to materialise.

Information on house prices in levels obtained from alternative sources indicates that the house price to income ratio remained relatively high in 2016. Information on house prices in levels, when available, can be helpful to access how much adjustment has taken place. Graph 11 shows Cypriot house prices in levels as a ratio to gross disposable income of households. One data point has been

tentatively calculated from alternative sources and then extrapolated to other years using either the ECB price index, which is also used later on in the econometric analysis, or alternatively the Eurostat price index (see Annex 1 for the methodology). The price information in levels shows that in 2016, the house price-to-income ratio stood between 10 and 17, approximately, while according to the literature the prudency level for this ratio is below 10.¹⁵ This information signals that to maintain houses affordable house price growth going forward should still be contained and not exceed the growth rate of household gross disposable income.

Graph 11: House price-to-income ratio, alternative sources for house prices in levels



Source: Household Finance and Consumption Survey (HFCS), RICS, ECB, Eurostat and own calculations explained in Annex.

Modelling Cypriot house prices

The empirical model

A simple way to forecast Cypriot house prices is to relate them to purchasing capacity as previous studies have done for other countries. The house price that households can afford with credit is a function of their disposable income, the interest rate on housing loans, and the loan maturity. An increase in disposable income will increase the size of the payments that households can afford each period, while higher interest will lower the present value of these payments. Longer loan maturities allow for more payments to enter into the calculation, increasing the affordable price. All these effects have been summarised in the literature by a single variable, known as purchasing capacity, constructed as follows:¹⁶

$$CAP_t = \frac{kY_t}{(1+i_t)} + \frac{kY_t}{(1+i_t)^2} + \dots + \frac{kY_t}{(1+i_t)^T} = kY_t \frac{1-(1+i_t)^{-T}}{i_t} \quad (1)$$

This purchasing capacity represents the value of a loan at fixed interest rate (i_t) and maturity T that a household can sign up to if it devoted to its payment a constant fraction (k) of its income, where Y_t is disposable income per household. Abstracting from credit frictions (such as down-payments, collateral, and other credit constraints) and assuming that demand and supply in the property market balance out, a simple long-run model relating house prices (P_t), to purchasing capacity emerges (in logs):¹⁷

$$\ln(P_t) = \alpha + \beta \ln(CAP_t) \quad (2)$$

In Cyprus the purchasing capacity of residents alone may not be the best indicator of the buyers' purchasing capacity up to 2008, as sales to foreigners represented about 50% of the market, but data constraints make it difficult to capture the effect of foreign buyers in the market. The two main foreign markets for Cyprus are the UK and Russia, but considering a weighted average of the domestic purchasing capacity and that of the UK in euros does not improve the results (the required data to construct a Russian purchasing capacity is not available). Information on sales to foreigners could also be used but the data only exists from 2004 on an annual basis and from 2008 on a quarterly basis, reducing the sample considerably.

Household deposits may also be important to determine housing demand in Cyprus, as it is a social custom for parents to save to provide housing to children. In Cyprus, a measure of purchasing capacity of households based on income may not be the best indicator of affordability, as it has been a social custom for parents to save up to provide housing to their children, typically when they marry. As other savings instruments are less developed in Cyprus, household deposits could also be a good indicator of housing demand.

Given the importance of the foreign segment of the market in the case of Cyprus it is also important to test for the impact of developments in sales to foreigners. While the foreign segment of the market was in great part a driver of the boom in construction investment up to 2007, it is also greatly responsible for the burst of the bubble. Also, to the extent sales to foreigners yield now a better yield, the recovery of the foreign market may also play a significant role in explaining the recovery. The number of sales contracts by nationality (foreigners

versus Cypriots) is available from the Department of Land Surveys of Cyprus. Between 2004 and 2007 the data is annual and has been interpolated to quarterly, using the seasonal pattern of the quarterly data, available from 2008 to date.¹⁸ Both the numbers and the share in total sales have been considered in the analysis.

A range of other variables may also contribute to explaining house price developments, including indicators of housing over-/under- supply. Data on the house (dwellings) stock is only available on an annual basis but can be interpolated using investment in dwellings. The ratio of the housing stock to population, which has been found to be significant for other studies, can be used as an indicator of over/under supply.¹⁹ An increase in this variable should signal a shift in the bargaining power towards buyers and point towards a reduction in prices.

Credit market indicators may also play a role but the data has its limitations. Conditions in the credit market can also be important to explain house price developments as liquidity strapped households may not afford to buy a house, even if their income is relatively high, without having access to credit.²⁰ However, the ECB bank lending survey indicator of credit tightening has a very short sample in the case of Cyprus and would limit the estimation sample considerably. It is possible to use instead credit to households, which is available for a reasonable number of years, with the caveat that this variable is likely to be endogenous to house prices when housing loans represent a large part of total loans. This variable has nevertheless proved to be a useful indicator of house price developments in other studies, and the endogeneity problem can be addressed to some extent with the estimation methodology. An alternative variable, which is highly correlated with credit conditions, both as a driver and as a consequence is the ratio of non-performing loans (NPLs) to total loans. Since in Cyprus there have been changes in the definition of NPLs over the sample, we use a spliced series over the period from 2005Q1, with its caveats in mind.²¹

Finally, the unemployment rate can also be used to proxy for demand constraints.²² A higher unemployment rate can signal more inequality in the distribution of income among households. It also indicates a higher probability of getting unemployed, increasing uncertainty over future income flows.

This leads households to postpone purchasing decisions and banks to tighten credit supply.

Estimation results and price forecasts

There are limitations in the analysis in terms of data availability and sample size, but model estimates can give insights on the correlation between house price developments and the various explanatory variables. Alternative versions of the housing price model have been estimated using an error correction specification that implies that house prices can temporarily deviate from the long-term model described in equation (2) but will return to it after some time. Rather than proposing a model, the aim of the exercise is to document the properties of alternative models, and highlight the variables that appear to be empirically more important for the analysis. The estimation uses a two-step approach, with the long-term model estimated first using the Dynamic Ordinary Least Squares (DOLS) methodology, and the short-run equation, determining the adjustment to the long-run, estimated conditional on the DOLS parameters (Equation 3).²³ We also account for endogeneity by assuming that it takes about 4-quarters for the explanatory variables to affect housing prices.²⁴ The dependent variable is the log change of the house price index of the ECB. The purchasing capacity variable (*cap* in logs) is described in the Appendix.

$$\Delta p_t = \lambda(p_{t-1} - \alpha^{DOLS} - \beta^{DOLS} cap_{t-5}) + \sum_{i=1}^4 \theta_i \Delta p_{t-i} + \sum_{i=0}^4 \theta_i \Delta cap_{t-i} + u_t \quad (3)$$

Purchasing capacity alone cannot explain house price trends in Cyprus. This could be explained to some extent by the relatively short sample available (from 2002Q2 on was used for the estimation), which may not allow identifying a stationary long-term relationship between house prices and purchasing capacity, but may also be due to the importance of additional variables in explaining house price trends. Given the relatively short sample it is not easy to estimate a very encompassing model without running into problems of instability, hence additional variables have been tested in alternation.

Adding additional variables to the analysis does improve the properties of the model. Table 1 summarises the estimation results for alternative models estimated (selected on the basis of their RMSE, with the exception of model 1 which was retained for comparison with the literature), while less-performing variations of these specifications are shown in the Appendix. Model 1 does not work well in the sense that the long-term relationship estimated is not stationary and therefore the properties of inference based on stationarity assumptions do not hold. It has been included in the table to show that purchasing capacity alone tends to over-predict house price growth in Cyprus. Including housing stocks stabilises the long-term relationship but points towards a slower recovery (Models 2 and 3). Including the unemployment rate yields implausible results (the models are shown in the appendix).²⁵

Table 1: House price models and forecasts

Dependent variable: Nominal house prices. All variables included in logarithm.								
Models	M1	M2	M3	M4	M5	M6	M7	Weighted Average
Long-run model	Purchasing capacity (+)	Purchasing capacity (+) Housing stocks (-)	Purchasing capacity (+) HH deposits (+) Housing stocks (-)	Purchasing capacity (+) Housing stocks (-) Sales to foreigners, % of total (+)	Purchasing capacity (+) HH deposits (+) MFI loans (+)	Purchasing capacity (+) Housing stocks (-) HH NPL ratio (-)	Purchasing capacity (+) Sales to foreigners (+) HH NPL ratio (-)	Out of sample forecast weights
Adjustment coefficient	-0.06	-0.13	-0.14	-0.13	-0.14	-0.33	-0.29	
N	50	52	52	44	52	37	37	
R ²	0.85	0.89	0.92	0.87	0.92	0.95	0.98	
RMSE	0.014	0.012	0.010	0.011	0.010	0.007	0.005	
RMSE Weights	0.09	0.11	0.13	0.11	0.12	0.18	0.25	
DF test on LT RESID	-1.57	-3.01*	-5.19**	-5.36**	-7.01**	-5.36**	-5.36**	
Forecast 2016	0.9%	-0.1%	-0.8%	1.0%	-0.2%	-0.3%	-0.4%	
Out of sample forecast error	2.3%	1.3%	0.6%	2.4%	1.2%	1.1%	1.0%	
Forecast error weights	0.07	0.13	0.27	0.07	0.14	0.16	0.17	
Forecast 2017	1.8%	1.9%	-1.1%	2.7%	0.3%	-0.1%	-0.3%	0.3%

Source: Own estimations. Models include a constant in the cointegrating vector and four to six lags of the explanatory variables. Dummies for 2004 Q1 and 2008 Q1 (membership in EU and EMU, respectively) are significant and have been included as explanatory variables. The Johansen cointegration test indicates 1-cointegrating equation among the variables (results available upon request) Except for disposable income and unemployment, for which the Commission forecasts have been used, other explanatory variables are forecasted using an ARIMA extrapolation. ** Rejects the hypothesis that the residual in $I(1)$ using Phillips and Perron (1988) critical values at 5% significance.

Including in the analysis indicators of excess supply or of credit conditions yields a more protracted recovery of house prices. The most pessimistic model overall is that which includes the ratio of housing stocks to the population combined with purchasing capacity and deposits (Model 3). This is however the model that yields the lowest out of sample forecast for 2016. Taking into consideration credit conditions (proxied by the NPL ratio) developments are similar, but more optimistic for 2017 (Models 6 and 7). Overall, averaging out the results weighted by the inverse of out of sample forecast error, yields a prediction of close to flat prices in 2017 (0.3%).¹ Weighing by the inverse of the RMSE the forecast for 2016 gives a similar, slightly higher forecast (0.5%).

Conclusion

There are many difficulties in estimating a house price model for Cyprus, but the analysis of the data can give some insights on the relative importance of possible explanatory variables. The existing data has many limitations in terms of sample size, frequency, changes in definition and inconsistencies across data sources. This study is a first step in creating a database of relevant data and understanding the empirical correlation between potential explanatory variables and house prices trends. There appears to be a correlation between house prices and purchasing capacity, deposits, foreign sales, housing stocks, and NPLs.²⁶ The presence of higher NPLs in particular appears to drag house prices down. High NPLs not only indicate credit tightening, but they also reflect pressure on households and businesses for real estate asset disposal as a mean to assist deleveraging, and therefore an ensuing increase in real estate supply.

Indicators point to 2017 as a turning point, but the recovery is likely to be protracted. Developments in the purchasing capacity of households, measured by the present value of their income streams, everything else constant, indicate that there are conditions for house prices to increase relatively fast. However, when other indicators are taken into account including household deposits, unemployment, credit conditions, and housing stocks the results are more mixed. In particular, when credit and excess supply indicators are

included in the analysis, the signs are of a more protracted recovery.

In Cyprus there has been a vicious loop between low house prices, NPLs and low credit to the economy, which will be difficult to break without ensuring that proceeds from sales are channelled to reducing the NPL stock. Credit for housing has been significantly curtailed in Cyprus. Despite that sales have been steadily increasing, even though the numbers are still much lower than previously. Many of these sales are undertaken in cash, and currently in Cyprus there is no means to ensure that the proceeds are used to pay the non-performing loans of the seller if applicable. If the proceeds are used instead to finance new buildings, this will protract the absorption of the existing stock (most of it encumbered), maintain house prices low at least in some areas, and will delay the balance sheet adjustment of banks. This adjustment is essential for credit to be channelled to productive investments that can secure the growth potential of the economy.

Higher rental yields would also assist deleverage by increasing the investment value of housing. Removing existing obstacles for further development of the rental market would help increase rental yields and increase the investment value of housing. With the boom in tourism currently experienced in Cyprus, demand for renting has increased, particularly in coastal areas. An excess of unregulated supply, in terms of quality and environmental impact, can also be detrimental for the market, hence attention must be paid to how this market evolves. In other areas, rent control and the underdevelopment of speedy channels for resolving disputes can create various distortions that may also require policy action.

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Box 1: THE CYPRIOT RENTAL MARKET

The Cypriot rental market is a dual market where there are two types of tenancies, one liberalised and one for which rent control applies. The “statutory” tenancy applies to properties, residential or business, completed by the 31st of December 1999 and situated within the “controlled areas” determined by the Rent Control Law (23/1983). Statutory tenants, who must be EU citizens who are residents in Cyprus, cannot be evicted except in certain circumstances provided by law, even if the rental contract has expired, and increases in the rent are regulated by law. In such cases, the owner has to proceed through the Rent Control Court to repossess his property. All the other tenancies, remain contractual tenancies and do not fall under the protection of the Rent Control Law, but are subject to the agreement made by the parties. Usually in such tenancies, the tenant remains in possession of the property only during the lease period unless the tenancy is renewed or extended. If the tenant does not leave after the regular end of the tenancy, then the tenancy becomes a periodic tenancy, and both landlord and tenant should give at least a one-month notice for its termination. Any claims in relation to a contractual tenancy fall under the jurisdiction of the District Court.

Rent controls make a number of properties less attractive for investors, lowering their value and liquidity. The Rent Control Law (23/1983) allows for an agreed increase of no more than 14 % of the existing rent and only after two years have passed from the date of the last application or the date of the last voluntary increase. If the tenant refuses to pay the increased rent, the Rent Control Court will determine a “reasonable rent”, taking into account the official value, and factors such as age, size, location and condition of the dwelling. This inflexibility and reliance on the courts makes it less attractive for owners to invest in renovation and lowers the investment value of properties in Cyprus.

In the Cypriot rental market all disputes have to be resolved through the currently relatively inefficient court system, potentially making it less attractive for investors. Disputes regarding rent increases and evictions in Cyprus are currently settled through the courts. In the case of evictions, if a tenant refuses to return the dwelling despite the fact that landlord has given a proper notice, the remaining option for the landlord is to file a court action asking for the return of the dwelling. Cypriot procedural law does not provide for any accelerated form of procedure used for the adjudication of tenancy cases. Mediation and other alternative dispute resolution are rarely used, mainly due to their recent introduction into the Cypriot legal system (Law 159 (I)/2012). It is also worth noting that Cypriot law does not provide for any institutions to which the tenant may refer to in order to have his rights clarified/protected.

Annex 1**Table A1: Alternative house price models and forecasts**

Dependent variable: Nominal house prices. All variables included in logarithm.						
Additional Models	M8	M9	M10	M11	M12	M13
Long-run model	<i>Purchasing capacity (+) HH deposits (+)</i>	<i>Purchasing capacity (+) Unemployment rate (-)</i>	<i>HH deposits (+) Unemployment rate (-)</i>	<i>HH deposits (+) MFI loans to HH (+)</i>	<i>Purchasing capacity (+) Deposits (+) Sales to foreigners (+)</i>	<i>Purchasing capacity (+) HH Deposits (+) Sales to foreigners, % of total (+)</i>
Adjustment coefficient	-0.10	-0.09	-0.07	-0.11	-0.20	-0.18
N	52	52	52	52	44	44
R²	0.88	0.87	0.86	0.90	0.91	0.89
RMSE	0.013	0.014	0.014	0.012	0.009	0.010
DF test on LT RESID	-2.4	-2.87	-4.57**	-5.03**	-4.85**	-5.29**
Forecast 2016	1.7%	1.4%	0.1%	0.0%	0.9%	0.8%
Forecast 2017	0.3%	1.6%	-1.4%	-0.1%	0.8%	-0.2%

Source: Own estimations. Models include a constant in the cointegrating vector and four to six lags of the explanatory variables. Dummies for 2004 Q1 and 2008Q1 (membership in EU and EMU, respectively) are significant and have been included as explanatory variables. The Johansen cointegration test indicates 1-cointegrating equation among the variables (results available upon request). Except for disposable income and unemployment, for which the Commission forecasts have been used, other explanatory variables are forecasted using an arima extrapolation. ** Rejects the hypothesis that the residual in I(1) using Phillips and Peron (1988) critical values at 5% significance.

Variables used in the analysis

Purchasing capacity: present value of gross disposable income per household taking into account an average mortgage duration of 25 years, and Cyprus mortgage rates as a discount factor. Households are estimated using population data and the average number of persons per household. Gross disposable income forecasts are the EC Commission forecasts for 2016 and 2017 interpolated. Mortgage duration and interest rates are kept constant over the forecast horizon. The number of households is forecast by extrapolating the trend. Sources: Eurostat and Central Bank of Cyprus.

Household deposits: total household deposits in Cypriot MFIs, divided by the number of households (the latter is estimated as indicated above). The forecast uses an arima extrapolation. Source: Central Bank of Cyprus long series.

Unemployment rate: Cyprus quarterly unemployment rate, LFS survey. Forecast uses the EC commission forecast for 2016 and 2017, interpolated. Source: Eurostat.

Sales to foreigners: Number of registered sales contracts by nationality (foreigners vs Cypriots). The share is calculated as the ratio of sales to foreigners over the total sales. It is forecast using an arima extrapolation. Source: Cyprus department of land surveys.

Housing stocks: Annual stock of housing in Cyprus (available in Cystat) interpolated using investment in dwellings (constant prices), divided by the population (national accounts). This is forecast using an arima extrapolation. Source: Cystat and Eurostat.

Household NPL ratio: Ratio of households non-performing exposures to total household exposures (loans) provided by the Central Bank of Cyprus (spliced series, since 1995), updated to 2016 using data published by the CBC. The forecast uses an arima extrapolation. Source: Central Bank of Cyprus.

MFI loans: total housing loans in Cypriot MFIs, divided by the number of households (the latter is estimated as indicated above). The forecast uses an arima extrapolation. Source: Central Bank of Cyprus long series.

Information on house prices in levels for Cyprus

The Eurosystem Household Finance and Consumption Survey (HFCS) allows to derive a figure for house prices in Cyprus of 1710€/m² for 2012 (first wave of HFCS, see also ECB, 2013) and 1483€/m² for 2014 (second wave of HFCS). Since richer households tend to be underrepresented in the HFCS survey, it is common practice to weigh observations by an approximation of the true weight of the share of households in each income bracket. One possible variable to proxy for these weights in the case of Cyprus is relative electricity consumption, and this proxy has been used in calculations..

The RICS house price analysis provides figures for houses and flats with a weighted average of 1522.7€/m² in 2012 and 1280.6€/m² in 2015. Since the concept of floor area used is the "gross external area" of the property including external walls (as defined in the RICS' Code of Measurement Practice 6th Edition), a corrective factor must be used to convert external walls into useful floor area. When this correction is applied, the values become 2508€/m² and 2109.2€/m², for 2012 and 2015, respectively. This is sizeably higher than the figures calculated from the HFCS, but RICS prices may show an upward bias due to the fact that houses included in the estimations are in urban areas and apartments in city centres.

Since these different sources are not available for the same period, and since there are two different indexes that may be used to describe the growth rate of house prices in Cyprus (the Eurostat and the ECB indexes described in the text) these alternative growth rates can be applied to the alternative sources of prices in levels to allow for comparisons. This allows observing that the two waves of the HFCS give very similar values for the same year, while the RICS prices are higher.

An extra source which can be used are realtors' online offers (the sample corresponds to 6321 dwellings offers from October 2017). Using the number of dwellings by districts obtained from the census data of 2011, this source gives the weighted average of 2590.8€/m² and a weighted median of 1840.3€/m², corresponding to an average surface of 197.1m² and a median surface of 145m². The significant discrepancy between the average and the median values suggests a likely over-representation of prime and luxury goods in the sample of prices advertised online, which would give an upward bias. In any event, prices from realtors tend to be higher than transaction prices. Extrapolating the prices in levels obtained from the RICS and the HFCS for 2017, the median price from realtors would lie in between these estimates, while the average would lie above. Average and median realtors prices correspond to prices to income ratios of 17.7 and 12.6, respectively.

¹ Guiso et al. (2013) show that the willingness to default increases in both the absolute and relative size of the home-equity shortfall, on others having defaulted previously, and on the probability of becoming unemployed among other things.

² See Halliassos et al. (2008), who use two waves (1999 and 2002) of the Cyprus Surveys of Consumer Finances, discontinued since, to document the importance of house gifts in Cyprus (typically from parents to children) to determine the rate of home ownership in the country.

³ The bank lending survey (BLS) contains 22 standard questions on past (previous three-month period) and expected (for the following three-month) credit market developments. Overall, the BLS includes 18 backward and 4 forward-looking questions, in order to capture both recent and expected developments, which make up the backward looking and the forward looking indexes of credit restrictions.

⁴ See European Commission (2016).

⁵ Up to July 2013, the definition of NPLs in Cyprus covered only the value of loans and advances that were not fully covered by collateral and were in arrears for more than 90 days. After July 2013, the central bank of Cyprus imposed a new, stricter, definition. The definition changed to include not only loans in arrears for more than 90 days irrespective of collateral, as called for by the International Financial Reporting Standards (IFRS), but also restructured loans that at the time of restructuring were either part of NPLs or were in arrears for more than 60 days. The restructured loans had to remain classified as NPLs for at least six months, or until the largest principal payment for amortised loans had been made or until maturity for bullet loans. The new definition raised somewhat the volume of NPLs, but provided extra assurance against cosmetic restructurings or restructurings that are themselves subject to a risk of relapsing into arrears. At the end 2014, this definition was made stricter by increasing the minimum probation period for forbome loans remaining classified as NPLs from 6 to 12 months and by requiring performing restructured loans presenting arrears greater than 30 days to be classified as NPLs.

⁶ See European Commission (2016).

⁷ It restricts the lenders (i.e. the banks) to alienate properties mortgaged by the seller (i.e. the developers) that are currently under the possession of trapped buyers (Immovable Property Transfer and Mortgage Law Amendment No. 10 of 2015). The law also gives the discretion to the Director of the Department of Lands and Surveys to exempt, eliminate, transfer and cancel mortgages and/or other encumbrances applicable on the property and to transfer the title deed to the final buyer.

⁸ This allows for the issuance of the Certificate of Approval, which is prerequisite for the issuance of a title deed. This measure offers trapped buyers increased guard against the lender of the seller, since a title deed must exist in order an application under the provisions of the "trapped buyer law" to be processed. The number of buyers in this situation is uncertain but according to the Cypriot press ranged around 14,000 by June 2017 (Cyprus property news, 24th June 2017). In May 2017, courts in Cyprus ruled that provisions of the "trapped buyers' law" were unconstitutional, creating uncertainty on the process. <http://www.news.cyprus-property-buyers.com/2017/06/24/retrieve-trapped-buyers/id=00152584>

⁹ Department of Land Registry statistics cited by Cyprus property news, 24th June 2017. <http://www.news.cyprus-property-buyers.com/2017/06/24/retrieve-trapped-buyers/id=00152584>

¹⁰ This is the leading professional body for qualifications and standards in land, property, infrastructure and construction. RICS is headquartered in London.

¹¹ See European Commission (2016a).

¹² Building permits are relatively flat because developers have already a portfolio of permits. According to the Cyprus Developers Association, since there is a long time lag in Cyprus to obtain a building permit (more than 2 years), developers followed the practice of stocking plots of land, submitting the corresponding building plans for approval well ahead of demand materialising.

¹³ See Krugman (1988).

¹⁴ <http://www.rics.org/Globa/ Cyprus%20Property%20Price%20Index%20Q1%202016.pdf>

¹⁵ See Briongne et al. (2017).

¹⁶ See McQuinn, H and O'Reilly, G. (2008) for the case of Ireland, and INSEE (2008) for the case of France.

¹⁷ Notice that the choice of the constant k serves only to better match the estimated capacity to the level of house prices and does not have an impact on the relationship between house prices and income capacity.

¹⁸ From 2008 onwards the data are actually available on a monthly frequency.

¹⁹ See Muellbauer, J., and Murphy, A. (1997) and OECD (2004, 2004a, and 2005).

²⁰ See Tsatsaronis, K and Zhu, H. (2004) and references therein.

²¹ The spliced series has been kindly provided by the Central Bank of Cyprus research department.

²² See Lissifov et al. (2008) and references therein.

²³ The dynamic ordinary least squares (DOIS) methodology of Stock and Watson (1993) extends the single-equation Engle-Granger (1987) approach to cointegration to allow for endogeneity within the specified long-run relationships. It adds both leads and lags of the differenced regressors to the long-run specification to correct for correlation between the error process and the level regressors.

²⁴ Estimates are not very sensitive to the lag choice.

²⁵ A model including the unemployment rate, purchasing capacity and deposits does not exhibit reversion towards the long-term trend, as the error correction term in the dynamic model is not significant. The model performs better when purchasing capacity is excluded. This may be due to a high correlation between the purchasing capacity and the unemployment rate.

²⁶ Notice that only models where a cointegrating relationship between the variables could be found were retained.

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