Assessing labor market conditions in Greece: a note

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Abstract

This note uses 18 labor market variables and a dynamic factor model to construct labor market conditions indicators (LMCI) for Greece. The indicators capture common movements among the labor market series and assess improvement of the labor market across a number of dimensions. LMCI changes indicator was deteriorated during the crisis, yet it rebounded back to positive values in late 2013, with speed of improvement being on average much higher compared to the pre-2009 period. Speed of improvement was weakened in early 2015, a period associated with increased political and economic uncertainty. Level LMCI indicator re-exceeded its long-run average 7 years after beginning of the crisis, while its current level is far below levels for the entire sample until 2008. The unemployment rate is found to understate the deterioration and the improvement in labor market conditions in the pre-crisis and the post-crisis period, respectively.

Keywords: Labor market conditions index, dynamic factor model, unemployment rate, factors.
JEL classification: E24; E27; C32; C33

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1 Introduction

Labor market conditions play an important role in economic policy. The evolution of labor market indicators, for example the unemployment rate, employment, or the labor force participation rate is extensively discussed in policy reports of the Federal Open Market Committee, the European Central Bank or the Bank of Greece. In recent years, emphasis is also placed on labor market indicators such as underemployment (part-time employment for economic reasons), long-term unemployment, hirings, job leavers and job losers, wages, and indicators representing consumers' and businesses' perceptions of job availability. These indicators represent several dimensions of the labor market, and are used in combination to the traditional ones to provide additional information about the state of the labor market.

Consideration of a range of labor market indicators is important in situations where the unemployment rate falls significantly, signaling a strong improvement of the labor market, but employment rises slightly and labor force participation rate declines. The improvement implied from the decline in the US unemployment rate in late 2013 is to some extent attributable to a decline in labor force participation rate, which contributed to the slow recovery of the labor market (Congressional Budget Office 2014). Further examples include underemployment, which captures under-utilized resources in the labor market not captured by the unemployment rate,[1] and long-term unemployment which also captures additional dimensions of the labor market.

Given the variety of data that are released each month (quarter), the signals on the health of the labor market may be mixed. In addition, Greece experienced a severe economic crisis in previous years and a number of structural reforms were implemented to create a more flexible labor market. In the aftermath of the crisis, relying on a couple of traditional labor market indicators may not be sufficient to assess underlying labor market conditions (Hakkio and Willis, 2014).

[1] Recent developments in underemployment in the euro area are discussed in Bodnár (2018).

Using a number of labor market variables and a dynamic factor model, we construct labor market conditions indicators (LMCI) for Greece. The indicators represent general labor market conditions in the sense that they capture common movements among our labor market series, and allow us to assess improvement of the labor market across a number of dimensions. This note follows closely Hakkio and Willis (2014), who construct the Kansas City Fed Labor Market Conditions Indicators released each month from the Federal Reserve Bank of Kansas City[2] and the Economic Research Department of the Federal Reserve Bank of St. Louis (FRED).[3] Further works related to ours include Chung et al. (2014), Zmitrowicz and Khan (2014), Armstrong et al. (2016), Baker and Ball (2018).

2 Labor market conditions indicators for Greece

2.1 Data

Our labor market data include 18 variables for the period 2001q1-2018q4.[4] These variables are the unemployment rate, employment, part-time employment for economic reasons, labor force participation rate, unemployed less than 1 month, unemployed 2-3 months, long-term unemployed, wages, self-employed with staff, self-employed without staff, hirings, layoffs, quits, consumers' unemployment expectations over next 12 months, businesses' employment expectations over the next 3 months for industry, services, retail trade, and construction, respectively.[5]

The data are available from the Hellenic Statistical Authority, the Information System ERGANI (Ministry of Labor) and the European Commission. All variables are seasonally-adjusted and are transformed in first differences (or first

[2] https://www.kansascityfed.org/research/indicatorsdata/lmci

[3] https://fred.stlouisfed.org/series/FRBKCLMCIM

[4] Time series data on most Greek labor market variables are not available prior to 2001. To estimate the indices, we use the longest time period available.

[5] Our choice of variables follows previous studies, but, to some extent, is limited due to data availability for Greece.

differences of logs), except for expectations indicators which, by construction, represent changes and are found to be stationary. More information on variables' transformation and data sources may be found in the Appendix.

2.2 The model

The dynamic factor model can be written in state-space representation as

$$X_t = \Lambda f_t + e_t \tag{1}$$

$$f_t = A_1 f_{t-1} + A_2 f_{t-2} + ... + A_p f_{t-p} + u_t \tag{2}$$

where X_t is the $N \times 1$ vector of stationary (standardized) variables, f_t is the $q \times 1$ vector of unobserved common factors (with $q << N$), Λ is the $N \times q$ matrix of factor loadings, $e_t \sim (0, \mathbf{R})$ is the $N \times 1$ white noise vector of idiosyncratic shocks assumed to be uncorrelated with f_t at all leads and lags (but can be weakly cross-sectionally correlated), $u_t \sim (0, \mathbf{Q})$ is the $q \times 1$ white noise vector of shocks to the factors. The two vectors e_t, u_t are assumed mutually uncorrelated and orthogonal. A finite order VAR(p) model is used to approximate the dynamics of the latent factors, with $A_1, ..., A_p$ the $q \times q$ matrices of autoregressive coefficients.

Estimation of model (1) and (2) is based on the Quasi ML-EM estimator developed by Doz et al. (2012).[6] Bai and Ng (2002) criteria and the scree plot (Appendix) suggest $q = 3$ factors explaining about 56% of the total variation of the 18 indicators. Lag-length of the VAR model is $p = 3$.[7] LMCI changes indicator is the first principal component of the projection of the labor market indicators onto the common factors, while the LMCI level of activity indicator is the cumulative form of LMCI changes. Following McCracken and Ng (2016), the data are recursively demeaned before estimating the factors to deal with the problem that the cumulative form takes the value of zero at the end of the sample. The LMCI changes indicator can be seen as isolating common variations at high

[6] Estimation was performed using the gretl DFM package (Lucchetti & Venetis, 2019)

[7] Based on lag length criteria and specification tests on the principal components.

frequencies (given the differenced nature of the data that results in highly volatile factor estimates), while the level LMCI indicator focuses on common variations at low frequencies.

3 Empirical Results

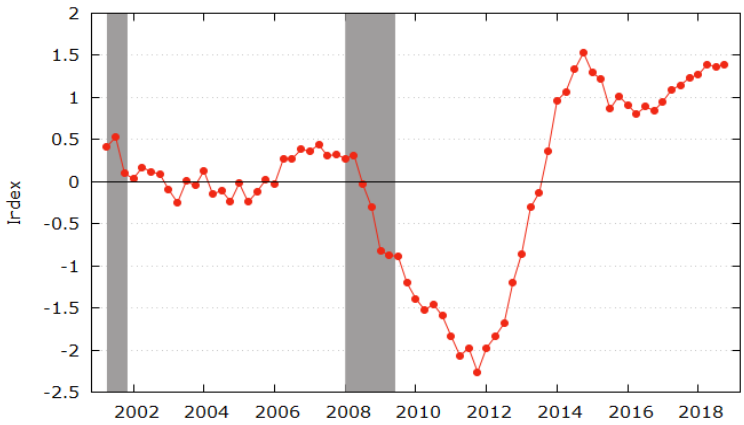
Figure 1 shows changes in labor market conditions. The indicator is standardized with the value of zero representing the historical average. LMCI changes indicator was substantially deteriorated during the crisis period; the indicator has been well below average for five years (2008q3-2013q3), yet it rebounded back to a positive value on 2013q4. Importantly, the speed of improvement is on average much higher compared to the period prior to 2009. The measure average value was about 0.0946 until 2008 and is 1.0923 since 2013q4. This result is also evident in the period following the Great Recession in the Kansas City Fed Labor market conditions index: momentum indicator.[8]

Notably, the speed of improvement was weakened from the 1st quarter of 2015 until the 2nd quarter of 2016, a period coinciding with January 2015 Greek elections that yielded to a change in the leading political force, the July 2015 referendum and September 2015 elections. The indicator maximum value after rebound attained in 2014q4 has not yet been reached. Hence, the political and economic events occurring in 2015q1-2016q2 may have negatively affected speed of improvement in labor market conditions, which was steadily improving since 2013q4. We note, however, that the present study does not formally relate the index decline to these effects. Rather, we find that the observed decline occurs during a period associated with increased political and economic uncertainty.

Finally, in-sample correlation of the variables with LMCI changes reveals that the changes index is mostly correlated with the unemployment rate,

[8]Federal Reserve Bank of Kansas City, KC Fed Labor Market Conditions Index, Momentum Indicator [FRBKCLMCIM], retrieved from FRED, Federal Reserve Bank of St. Louis; `https://fred.stlouisfed.org/series/FRBKCLMCIM`

Figure 1: Labor market conditions, Greece: changes

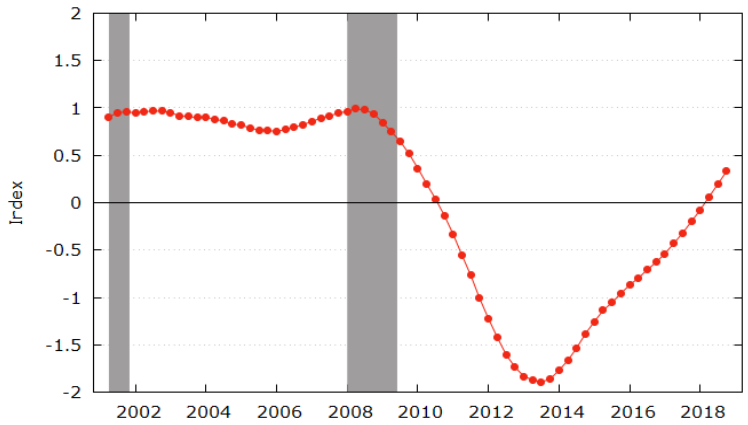


Notes: Shaded areas indicate US recessions. The index is standardized to have a zero mean and a standard deviation equal to one.

employment, unemployment expectations and businesses' employment expectations (Table 2, Appendix). A similar result regarding employment and expected job availability indicators (surveys) is found in Hakkio and Willis (2014), and in Baker and Ball (2018) for the euro area. The changes index also shows a significant correlation with part-time employment, long-term unemployment, self-employed, layoffs, and quits.

Figure 2 shows that the level labor market conditions indicator was also substantially deteriorated during the crisis and has been well below average since 2010q4 (deterioration began in 2008q4). Level LMCI is significantly improved over the past four years; its value has risen from -1.8606 in 2013q4 to -0.1990 in 2017q4. Yet, the level index rebounded back to a positive value only recently, in the 2nd quarter of 2018. Hence, it took about 7 years after beginning of the crisis for the level index to re-exceed its long-run average. Importantly, the current level (last sample quarter) is far below levels for the entire sample until 2008 (average level prior to 2009 was about 0.89). Using the trend we have observed in the level index over the past 10 quarters, we find that the level indicator will reach its pre-crisis average in the first quarter of 2020.

Figure 2: Labor market conditions, Greece: level indicator

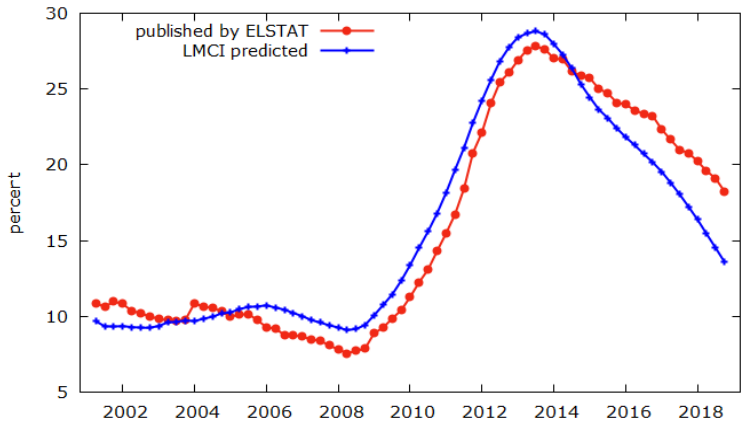


Notes: Shaded areas indicate US recessions. The index is standardized to have a zero mean and a standard deviation equal to one.

Finally, as in Hakkio and Willis (2014), Figure 3 shows the published unemployment rate and the unemployment rate that the LMCI level indicator would predict as resulting from the regression of the unemployment rate on level LMCI with leads and lags of differenced LMCI.[9] The figure shows that the increase in the unemployment rate during the crisis understated the deterioration in labor market conditions as measured by the level LMCI, while the recent decline understates improvements since 2014q4. For example, the published unemployment rate in 2013q3 was 27.8% and the unemployment rate predicted by level LMCI is 29.1%. Stronger deterioration (than the unemployment rate alone suggests) during the crisis may thus be related to substantial deterioration in other labor market measures, while the opposite might hold for the stronger improvement observed in recent years. A similar result is also found in Baker and Ball (2018) for the euro area.

[9]We employ dynamic OLS (Stock and Watson 1993) to construct an asymptotically efficient estimator in the cointegrating regression (the dependent variable and the regressor are I(1) and cointegrated). We include two leads and lags of the differenced LMCI.

Figure 3: Unemployment rate



4 Conclusions

We construct labor market conditions indicators for Greece. The constructed indices assess labor market performance from a general perspective since 2001, while they provide information on overall labor market conditions during the political and economic events related to the Greek crisis. The indices are useful for real-time analysis of the Greek labor market and for policy makers. An open question is whether the level index will be stabilized to the pre-crisis average or whether it will exceed it.

Appendix

Variables/data sources

Source: Hellenic Statistical Authority (ELSTAT):

`http://www.statistics.gr/en/statistics/pop`

unemployment rate (%), employment (thousands), part-time employment for economic reasons (% of total employment), labor force participation rate (%), unemployed less than 1 month (% of unemployed), unemployed 2-3 months (%

of unemployed), long-term unemployed (% of unemployed), wages (index), self-employed with staff (% of employed), self-employed without staff (% of employed)

Source: Information System ERGANI (Ministry of Labor):

https://www.ypakp.gr/index.php?ID=4VDtKQ71hM5YF1dT

hirings (thousands), layoffs (thousands), quits (thousands)

Note: Employment flows in the private sector (ERGANI data) were not available in time series form. We have collected these data from the issues published by the Ministry of Labor.

Source: European Commission:

https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys_en

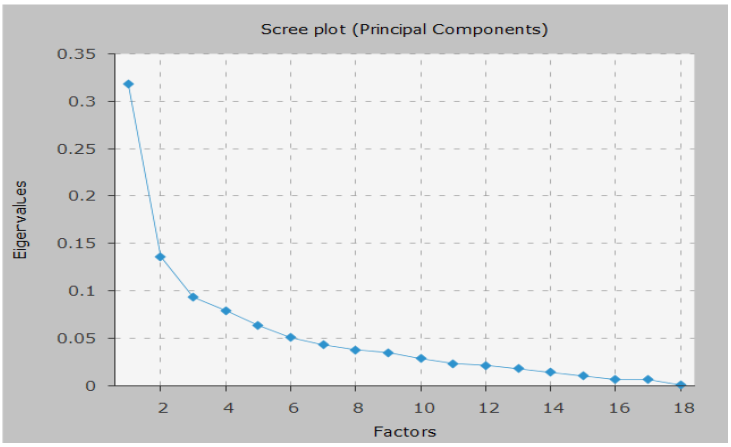
consumers' unemployment expectations over next 12 months (index), businesses' employment expectations over the next 3 months for industry, services, retail trade, and construction (index)

Tables and Figures

Table 1. Transformation of labor market indicators	
unemployment rate (%)	first differences
employed (thousands)	first differences of logs
part-time employment employment (% of total employment)	first differences
labor force participation rate (%)	first differences
unemployed less than 1 month (% of unemployed)	first differences
unemployed 2-3 months (% of unemployed)	first differences
long-term unemployed (% of unemployed)	first differences
wages (index)	first differences
self-employed with staff (% of employed)	first differences
self-employed without staff (% of employed)	first differences
hirings (thousands)	first differences of logs
layoffs (thousands)	first differences of logs
quits (thousands)	first differences of logs
unemployment expecations (consumers) (index)	level
employment expectations: services (index)	level
employment expectations: industry (index)	level
employment expectations: retail trade (index)	level
employment expectations: construction (index)	level

Table 2. Correlation of LMCI changes indicator with labor market variables	
unemployment rate	-0.89
employed	0.81
part-time employment	-0.37
labor force participation rate	0.14
unemployed less than 1 month	0.20
unemployed 2-3 months	0.23
long-term unemployed	-0.33
wages	0.14
self-employed with staff	0.32
self-employed without staff	-0.53
hirings	0.20
layoffs	0.34
quits	0.34
unemployment expecations (consumers)	-0.73
employment expectations: services	0.55
employment expectations: industry	0.72
employment expectations: retail trade	0.59
employment expectations: construction	0.29
Notes: Variables transformed as described in section 2	

Figure 4: Scree plot



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