Economics Bulletin

Volume 36, Issue 4

A note on the intertemporal labor dynamics in Turkey

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Abstract

In this paper, we investigate the nature of the negative relationship between the unemployment rate and the labor force participation rate in Turkey. We report that the discouraged unemployed worker phenomenon is not the main driving force behind the documented negative co-movement. We show that the negative relationship can be explained instead by 1) the simultaneous inflow of workers to the employed state from the inactive and unemployed states when the unemployment rate decreases, and 2) the simultaneous outflow of workers from the employed state to the inactive and the unemployed states when the unemployment rate increases. We also report that empirical intertemporal labor market transitions of couples do not provide evidence for within-household risk sharing in Turkey.

We would like to thank the faculty at the Department of Economics at Bogaziçi University for their valuable comments and contributions. We also thank the anonymous reviewer(s) for their insightful feedback and suggestions. Orhan Torul and Serdar Selçuk acknowledge financial support by Bogaziçi University Research Fund, grant number BAP 9081.

Citation: Serdar Selçuk and Orhan Torul, (2016) "A note on the intertemporal labor dynamics in Turkey", *Economics Bulletin*, Volume 36, Issue 4, pages 2063-2079

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Submitted: January 22, 2016. **Published:** November 09, 2016.

1 Introduction

In this paper, we analyze the nature of the observed negative relationship between the unemployment rate and the labor force participation rate in Turkey. In doing so, we rely on the use of realized transition probabilities across labor market states. According to the standard labor economics categorization, labor force can be decomposed into three labor market states; the employed (E), unemployed (U) and inactive (I) states. Participants of potential labor force can engage in bi-directional transitions between two of the three labor market states within two consecutive periods. For instance, some members of the employed category could choose to leave the labor force next period and become inactive members of the working age population, while simultaneously inactive members could decide to join the labor force, and manage to get a job, therefore move to the employed state next period. Accordingly, there are three labor market flow channels across the three labor market states.[1]

Hornstein (2013) emphasizes the importance of one particular channel, namely the one between the inactive and unemployed states, in understanding the nature of the observed negative relationship between the unemployment and the labor force participation rates for the United States. He discusses that one possible explanation for this empirical observation, which he coins as the IU hypothesis, is that as the labor market deteriorates, unemployed workers are more likely to quit the labor force out of desperation, while at the same time inactive workers are less likely to join the labor force with the considerable risk of not being able to find a job, thereby staying unemployed. Yet, his empirical analysis on the U.S. labor market refutes the practicality of this hypothesis, as he shows that actual net flows across the labor market states work *against* the aforementioned negative correlation, and would instead generate a positive correlation.

In this paper, following Hornstein's (2013) methodology, we test the empirical validity of this hypothesis for the Turkish Labor Market. We find that the IU hypothesis fails to explain the negative relationship between the unemployment and the labor force participation rates of Turkey, as well. We document that the negative relationship can be explained by 1) the simultaneous inflow of workers to the employed state from the inactive and unemployed states when the unemployment rate decreases, and 2) the simultaneous outflow of workers from the employed state to the inactive and the unemployed states when the unemployment rate increases. We also report that empirical intertemporal labor market transitions of couples do not provide evidence for within-household risk sharing in Turkey.[2]

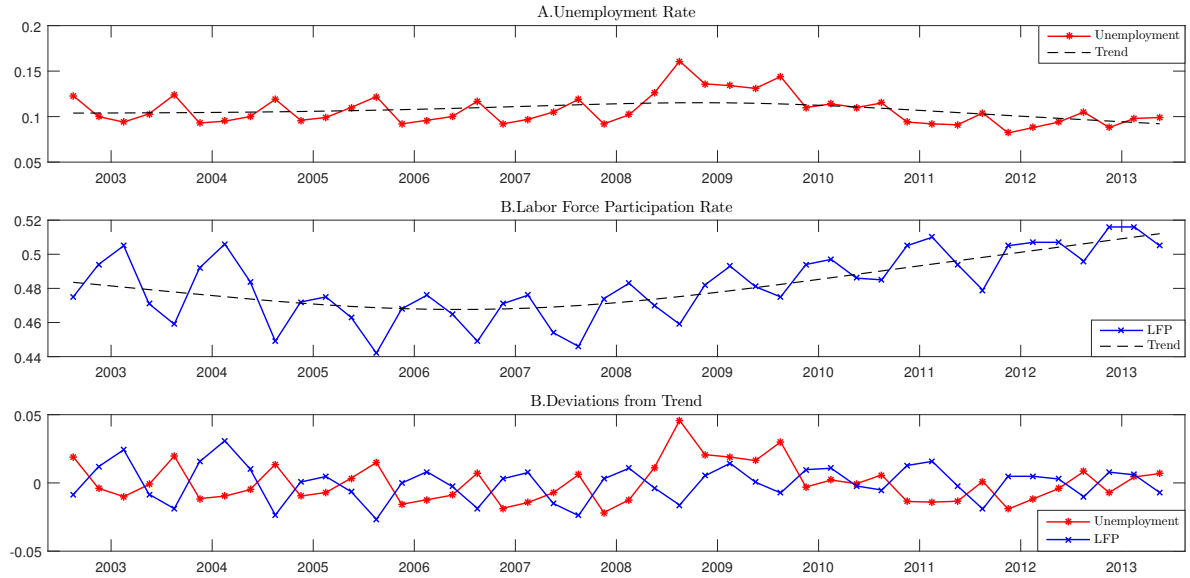
[1] While the channel between unemployment and employment (transitions within the members of the active labor force) is important in understanding unemployment rate dynamics, the employment and inactivity, and the unemployment and inactivity channels are critical in the determination of the labor force participation rate. For a detailed discussion, see Shimer (2012) and Sengul (2014).

[2] There are only a limited number of studies investigating the the Turkish labor market dynamics. As being exceptions, Sengul (2014) analyzes the inflow and outflow rates from unemployment and finds that the main determinant behind changes in the unemployment rate is the volatility of inflow rates in Turkey; and Tasci and Tansel (2005) investigate the determinants of transitions between labor market states by the use of a multinomial logit model utilizing the TurkStat's Household Labor Force Survey (2000 & 2001) data.

2 Unemployment and Labor Force Participation in Turkey

In this section, we investigate Turkish unemployment and labor force participation rates between 2003 and 2013 using quarterly data, and we report on their empirical co-movements.[3,4]

Figure 1: Unemployment and Labor Force Participation Rates in Turkey



In order to depict the negative empirical co-movement of the unemployment and the labor force participation rates, we display deviations of the two rates from their respective trends in Panel C.[5] In Table 1, we report correlation of coefficients calculated by the use of these detrended series [6]. Panel C and Table 1 offer clear empirical evidence for the observed negative relationship between the unemployment and the labor force participation (LFP) rates.[7]

[3]We use Turkish Statistical Institute's Labor Force Statistics (1988 - 2013) database for our analyses.

[4]The average unemployment rate between the first quarter of 2008 and the last quarter of 2009 is 12.5%, which is approximately 2% point higher than the average unemployment rate between 2003 and 2013. Further, the unemployment rate peaks in the first quarter of 2009 up to 16.1%. These figures indicate that the Turkish Labor Market was adversely affected by the ripples of the recent U.S. mortgage crises in 2008, as it can be seen in Panel A in Figure 1.

[5]We calculate trends using Hodrick-Prescott Filter using $\lambda = 1600$, as it is standard in the literature for the quarterly frequency.

[6]We also report cross-correlation coefficients for the lead-lag analysis following Hornstein (2013). For the sake of brevity, we, however, omit leads and lags beyond one period, since these calculated coefficients are statistically insignificant.

[7]Labor market characteristics of males and females differ considerably in the Turkish economy. In Table 5 on the Appendix, we report on the transition probabilities for males and females in order to display the severity of gender differences: for instance, average II (inactive-to-inactive) transition probability is considerably higher for females compared to males, which implies that inactive female members of the society are more likely to stay inactive compared to their already inactive male counterparts. Further, the labor force participation rate for females is substantially lower than that of males (as much as 46.4% on average within 2003-2013 period), although the difference is decreasing over time due the ever increasing female labor force participation in Turkey.

Table 1: Cross-correlation of Unemployment and LFP rates, 2003 - 2013

Corr$(u(t), l(t+s))$ for s	μ_u	μ_l	-1	0	$+1$
Total	0.106	0.482	0.048	-0.714^{**}	0.058
Male	0.103	0.707	-0.031	-0.711^{**}	0.134
Female	0.114	0.263	0.246	-0.562^{**}	0.033

** Statistically significant for $p < 0.05$

μ_u : Average unemployment rate, 2003 - 2013

μ_l : Average labor force participation rate, 2003 - 2013

3 Intertemporal Labor Market Mobility

3.1 Methodology to Calculate Transition Probabilities

We next focus on understanding the driving forces behind the observed correlations. To this end, we calculate realized intertemporal transitions across the three labor market states.

An individual in one of the three particular states has three transition possibilities for the next period: he can either remain in his initial state or he can move to one of the other two labor market states. For instance, an inactive worker in period t can find a job in period $t+1$, which is an example of transition from inactive to employed state, which we denote as *IE*.

The following matrix displays all possible across-state transition probabilities.[8].

$$P = \begin{bmatrix} p_{ee} & p_{eu} & p_{ei} \\ p_{ue} & p_{uu} & p_{ui} \\ p_{ie} & p_{iu} & p_{ii} \end{bmatrix} \tag{1}$$

We calculate the empirical transition probabilities by the use of realized transition frequencies.[9]

3.2 Transitions Across the Labor Market States

The Household Labor Force Survey (HLFS) by the Turkish Statistical Institute (TurkStat) collects information on labor market status of respondents for the year of the survey and the one before. We use these responses to calculate the realized intertemporal labor market transitions during the 2003-2012 period.[10,11]

[8]Each cell in P represents a transition probability between two labor market states. For instance, p_{eu} represents the probability of being unemployed at time $t+1$, conditional on being employed at time t.

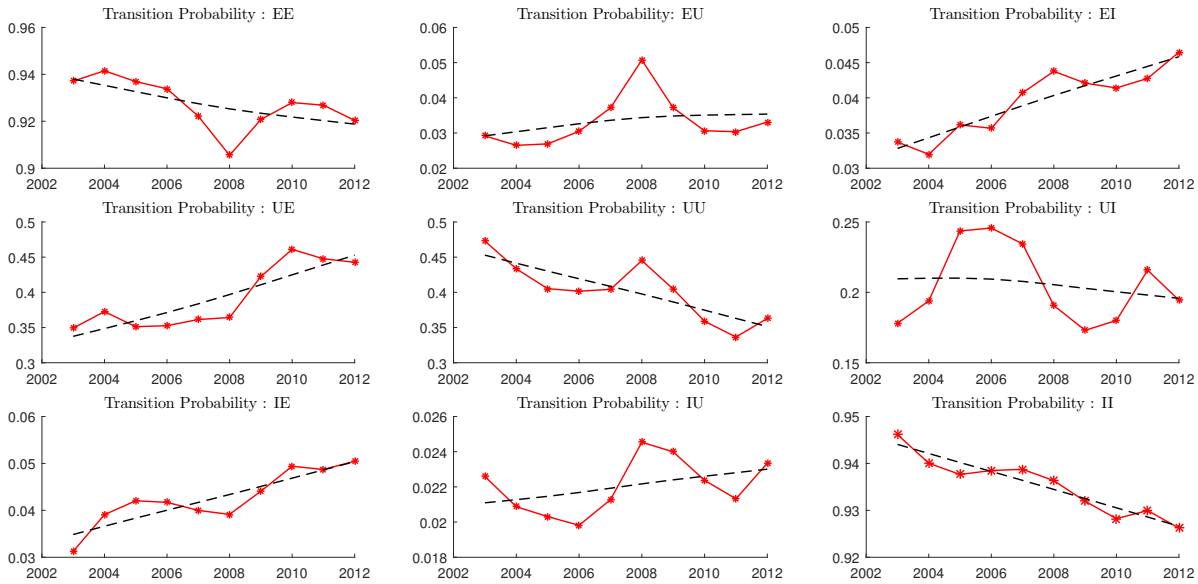
[9]Let $f_{ij,t+1}$ denote the total number of people moving from the labor market state i in period t to state j in period $t+1$, where $i, j \in \{E, U, I\}$. Then, the total number of individuals in state i at time t can be calculated as $s_{i,t} = \sum_k f_{ik}$. Accordingly, the realized probability of an individual to move from state i at time t to state j at time $t+1$ is simply: $p_{ij,t} = \frac{f_{ij,t+1}}{s_{i,t}}$.

[10]While HLFS does not have a longitudinal structure, it still is suitable to calculate the labor market transition matrix, as it keeps track of the labor market status of respondents for the most recent two years.

[11]Number of observations for the conducted surveys differ each year. Average number of observations between 2004 and 2013 is 497,858, with the lowest value being 472,837 in the 2004 and the highest being 522,171 in the 2010.

In Figure 2, we display the calculated transition probabilities across the three states. Lines, marked with asterisks, in Figure 2 refer to actual transition probabilities, whereas dashed lines refer to their respective trends.[12,13]

Figure 2: Labor Market State Transition Probabilities



The *UI* transition probability starts to decline around the U.S. mortgage crises in 2008, during which the unemployment rate in Turkey surpasses its long-run trend, and remains so until mid-2010. Throughout this period, the probability of an unemployed worker to stop searching for a job and leaving the active labor force is decreasing despite the relatively high unemployment rate. In a similar way, the *IU* transition probability increases at times of high unemployment rates. These facts suggest that when the labor market deterioates, inactive workers *do* enter the active labor force albeit as unemployed, despite shrinking job opportunities.[14]

According to the IU hypothesis, as the unemployment rate increases, some of the unemployed workers would stop searching for a job and choose to leave the labor force. At the same time, already inactive workers would find it less appealing to join the labor force due to their limited chances of finding a job. As a result, these dynamics would generate a negative correlation between the labor force participation and the unemployment rates.

In order to test the validity of IU hypothesis for the Turkish case, we calculate correla-

[12]In Figures 6 and 7 on the Appendix, we display the transition probabilities for males and females, separately. It is evident from these figures that male and female members of the labor force have distinctly different transition prospects, which is particularly pronounced for the *IU* and *II* probabilities, both in terms of their levels and growth rates. Also, it is worth mentioning that the time trends of *IU* and *II* for the whole population, as depicted in Figure 2, are qualitatively similar to the trends for females, and not males.

[13]The male members of the labor force were more adversely affected by the recent U.S. mortgage crises than their female counterparts. The average male unemployment rate between the first quarter of 2008 and the last quarter of 2009 is 12.3%, i.e. 2% points higher than the average male unemployment rate between 2003 and 2013. The female unemployment rate, however, for the same crises period is 13%, which is approximately 1.5% higher than the average female unemployment rate for the same decade of interest.

[14]The observed patterns in *UI* and *IU* for the Turkish labor market during the U.S. mortgage crises are driven mainly by the male, and not female participants of the working age population, as its depicted in Figures 6 and 7.

tions between the detrended transition probabilities and the unemployment rate, and report our findings in Table 2. The first matrix in Table 2 shows that the probability of an unemployed worker to leave the active labor force (*UI*) *does not* positively correlate with the unemployment rate. Similarly, the probability of an inactive worker to join the labor force as unemployed (*IU*) *does not* negatively correlate with the unemployment rate. These findings clearly contradict with the IU hypothesis. Further, panels *UI* and *IU* in Figure 2 are also not in accordance with the IU hypothesis, since *UI* decreases and *IU* increases right after the 2008 crises when the unemployment rate rises sharply.[15]

Table 2: Correlations between Transition Probabilities and the Unemployment Rate (2003 - 2012)

Total				Male				Female			
	E_{t+1}	U_{t+1}	I_{t+1}		E_{t+1}	U_{t+1}	I_{t+1}		E_{t+1}	U_{t+1}	I_{t+1}
E_t	-0.940^{***}	0.959^{***}	0.750^{**}	E_t	-0.940^{***}	0.966^{***}	0.592^{**}	E_t	-0.893^{***}	0.894^{***}	0.828^{***}
U_t	-0.461	0.874^{***}	-0.405	U_t	-0.419	0.875^{***}	-0.399	U_t	-0.754^{**}	0.877^{***}	-0.541^{*}
I_t	-0.686^{**}	0.800^{***}	0.368	I_t	-0.734^{**}	0.859^{***}	0.390	I_t	-0.480^{*}	0.754^{**}	0.156

*** Statistically significant for $p < 0.01$
** Statistically significant for $p < 0.05$
* Statistically significant for $p < 0.10$

Our findings suggest that when the unemployment rate increases, 1) the inflow of workers to the unemployed state from the inactive state increases, and 2) the outflow of workers from the unemployed state to inactive state decreases.[16] Therefore, the calculated transition probabilities between the unemployed and the inactive states generate a *positive* co-movement between the unemployment and the labor force participation rate, contrary to the *negative* correlation prediction by the IU hypothesis. Therefore, the negative relationship between the unemployment and the labor force participation in the Turkish labor market cannot be attributed to the "*discouraged unemployed worker*" phenomenon.

4 Sources of the Negative Co-Movement

In the previous sections, we report that the negative relationship between the unemployment and the labor force participation rates cannot be explained by the IU hypothesis. In this section, we conduct a series of counterfactual experiments to demonstrate that the bi-directional flow channels between the employed state and the two labor market states (and *not* the channel between the unemployed and the inactive states) are the driving forces behind observed negative

[15]Transition probabilities conform with aggregate labor market dynamics in Turkey for the period of interest, which is evident from the sharp changes in transition probabilities during the 2008 crises time when the unemployment rate also rises sharply. For instance, around 2008, the *EU* transition probability surpasses its long-run trend, while *EE* stays below its trend. Another interesting observation about the Turkish labor market dynamics can be that, as it is evident from the downward trends in the diagonal entries of Figure 2, intertemporal labor market persistence is declining steadily and transitivity across the three labor market states is increasing almost monotonically.

[16]While the correlation coefficient for the *IU* is positive and statistically significant, the coefficient for *UI* is negative, yet not significant at 10%. In a similar way, when the unemployment rate decreases, the inflow of workers to the unemployed state from the inactive state decreases and the outflow of workers from the unemployed state to inactive state increases.

relationship. In doing so, we construct hypothetical unemployment and labor force participation rates to investigate how variations in particular flow channels contribute to the realized co-movements of the unemployment and the labor force participation rates.[17]

We construct hypothetical unemployment and labor force participation rates by relying on Shimer's (2012) methodology. Shimer (2012) proposes a method to calculate the contribution from each one of the transition probabilities on the fluctuations of the unemployment rate. We employ a modified version of Shimer's (2012) methodology to address the fluctuations in the unemployment *and* the labor force participation rates.[18]

The following equations show the fractions of employed, unemployed and inactive workers in the labor force at time t. We use the *actual* values of *IE*&*EI* transition probabilities, while we set all other transition probabilities equal to their *trend* values at time t.

$$e_t^{IE\&EI} = (\bar{p}_{ui,t} \cdot p_{ie,t} + \bar{p}_{iu,t} \cdot \bar{p}_{ue,t} + p_{ie,t} \cdot \bar{p}_{ue,t}) \tag{2}$$

$$u_t^{IE\&EI} = (p_{ei,t} \cdot \bar{p}_{iu,t} + p_{ie,t} \cdot \bar{p}_{eu,t} + \bar{p}_{iu,t} \cdot \bar{p}_{eu,t}) \tag{3}$$

$$i_t^{IE\&EI} = (\bar{p}_{eu,t} \cdot \bar{p}_{ui,t} + \bar{p}_{ue,t} \cdot p_{ei,t} + \bar{p}_{ui,t} \cdot p_{ei,t}) \tag{4}$$

where e_t , u_t and i_t refer to the fraction of the employed, unemployed and inactive members of the working age population respectively, and $\bar{p}_{eu,t}$ refers to the trend value of the *EU* transition probability at time t. We use these three fractions to calculate hypothetical unemployment rates (U_t) and hypothetical labor force participation rates (LFP_t) generated via the *IE*&*EI* flow channel.[19]

In Figure 3, we display the resulting hypothetical time series of the unemployment and the labor force participation rates by the three labor market flow channels.[20]

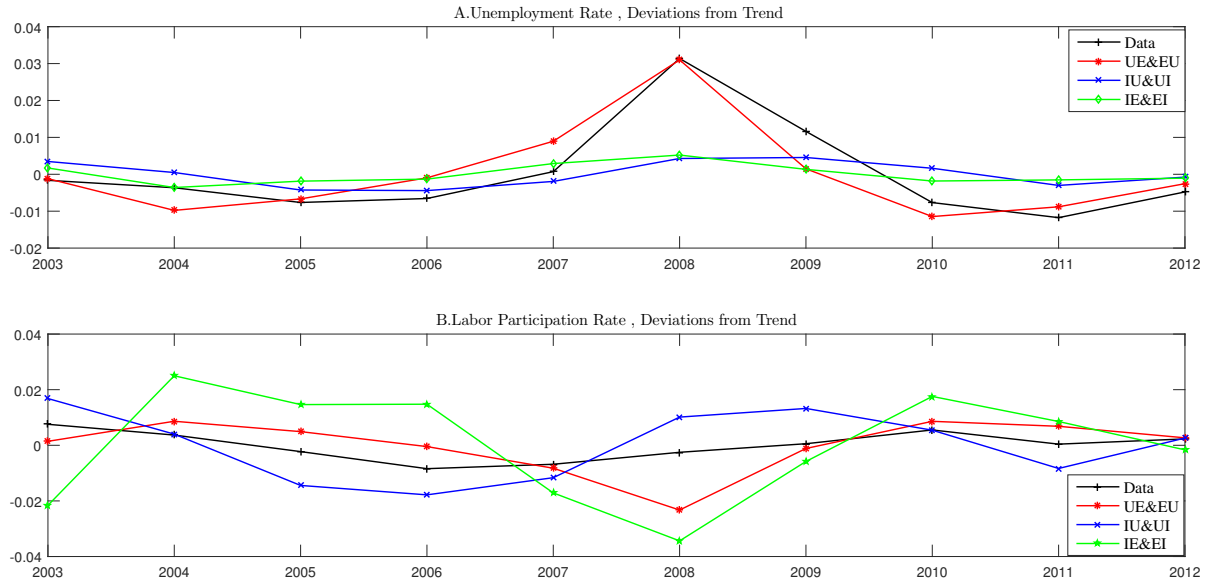
[17]There are three flow channels we discusss across the three labor market states: 1) the *UE*&*EU* channel refers to the transitions between the unemployed and the employed states 2) the *IU*&*UI* channel refers to the transitions between the inactive and the unemployed states, and 3) the *IE*&*EI* channel refer to the transitions between the inactive and the employed states.

[18]Shimer (2012) calculates hypothetical unemployment rates by the use of one of the six transition probabilities: *EU*, *EI*, *UE*, *UI*, *IE* and *IU*. Instead, we use contributions of each one of the three channels (and not just each one of the six probabilities) in generating hypothetical unemployment and labor force participation rates.

[19]We calculate hypothetical unemployment and hypothetical labor force participation rates via the *IE*&*EI* transition flow channel at time t as follows: $U_t = \frac{u_t^{IE\&EI}}{u_t^{IE\&EI}+e_t^{IE\&EI}}$ and $LFP_t = \frac{u_t^{IE\&EI}+e_t^{IE\&EI}}{u_t^{IE\&EI}+e_t^{IE\&EI}+i_t^{IE\&EI}}$. We calculate hypothetical unemployment and labor force participation rates via the other two labor market flow channels in a similar way.

[20]Following Hornstein (2013), we report results by the use of detrended the hypothetical series. Results by the use of raw series are available upon request subject to the confidientiality of the data set.

Figure 3: Total Hypothetical Unemployment and LFP Rates



In Figure 3, we display which of the three channel(s) generate a hypothetical negative co-movement of the unemployment and the labor force participation rates, as seen in the data. The blue lines in Figure 3, referring to the hypothetical rates via the *IU&UI* flow channel, are *not* consistent with the negative co-movement observed in the data, as the two hypothetical series co-move in the same direction over time, thereby generating a *positive* correlation instead. Both the red and the green lines, however, referring to the *UE&EU* and the *IE&EI* flow channels respectively, *do* generate negatively-correlated hypothetical unemployment and labor force participation rates. Table 3 confirms that the *EU&UE* and *IE&EI* flow channels generate negatively-correlated hypothetical unemployment and labor force participation rates, whereas the *IU&UI* flow channel generates positively-correlated hypothetical unemployment and labor force participation rates, contrary to what data actually suggests.[21]

Table 3: Correlations between Hypothetical Unemployment and LFP Rates, 2003 - 2012

	Total			Male			Female		
	-1	0	$+1$	-1	0	$+1$	-1	0	$+1$
UE&EU	-0.417	-0.997^{***}	-0.352	-0.390	-0.997^{***}	-0.351	-0.361	-0.940^{***}	-0.287
IU&UI	0.275	0.954^{***}	0.537	0.244	0.940^{***}	0.582^{**}	0.196	0.993^{***}	0.299
IE&EI	-0.229	-0.961^{***}	-0.319	-0.284	-0.954^{***}	-0.373	-0.130	-0.969^{***}	-0.230

*** Statistically significant at $p < 0.01$
** Statistically significant at $p < 0.05$

To summarize, we report that the transitions between the unemployed and the inactive states generate positively-correlated unemployment and labor force participation rates, thereby failing to address the observed negative correlation in the data. In other words, the "discouraged

[21] In Table 3, we calculate correlation coefficients by the use detrended series, as in Figure 3. We report the results from our counterfactual experiments on gender differences in Figure 8 and 9 on the Appendix. We report that the characteristics of hypothetical male and female unemployment and labor force participation rates are qualitatively similar.

unemployed worker" phenomenon fails to explain the aforementioned negative relationship. We show that the *IE*&*EI* and the *EU*&*UE* flow channels, however, *do* generate the negative correlation. Further, we illustrate in Table 2 that the *EU* and *EI* transition probabilities are positively correlated with the unemployment rate, whereas *IE* and *UE* transition probabilities are negatively correlated with the unemployment rate. In light of these results, our findings suggest that when the unemployment rate is above its trend, outflow of workers from the employed state to *both* the unemployed *and* the inactive states increases. Similarly, when the unemployment rate is below its trend, inflow of workers to the employed state from *both* of the two other states decreases. To motivate further on this claim, in Table 4 we report the correlations of inflows to and outflows from the employed state.

Table 4: Inflow and Outflow Correlation for Employment, 2003 - 2012

	Total	Male	Female
$corr$(*EU*,*EI*)	0.586^{**}	0.681^{**}	0.773^{**}
$corr$(*UE*,*IE*)	0.855^{***}	0.511^{**}	0.911^{***}

*** Statistically significant at $p < 0.01$
** Statistically significant at $p < 0.05$

The first row of Table 4 demonstrates that outflows from the employed state are directed towards both the unemployed and the inactive states, thereby generating a statistically significant positive correlation for both the whole population and for the two gender sub-groups. The second row of Table 4 illustrates that the inflows to the employed state are generated by the contemporaneous movements out from the inactive and the unemployed states, resulting again in a positive and statistically significant correlation for the whole population, as well as for the gender sub-groups. Hence, the negative relationship between the unemployment rate and the labor force participation rate can be attributed to 1) the simultaneous inflow of workers from inactive and unemployed states to the employed state at times of low unemployment and 2) the outflow of workers from the employed state simultaneously to the inactive and unemployed states at times of high unemployment.

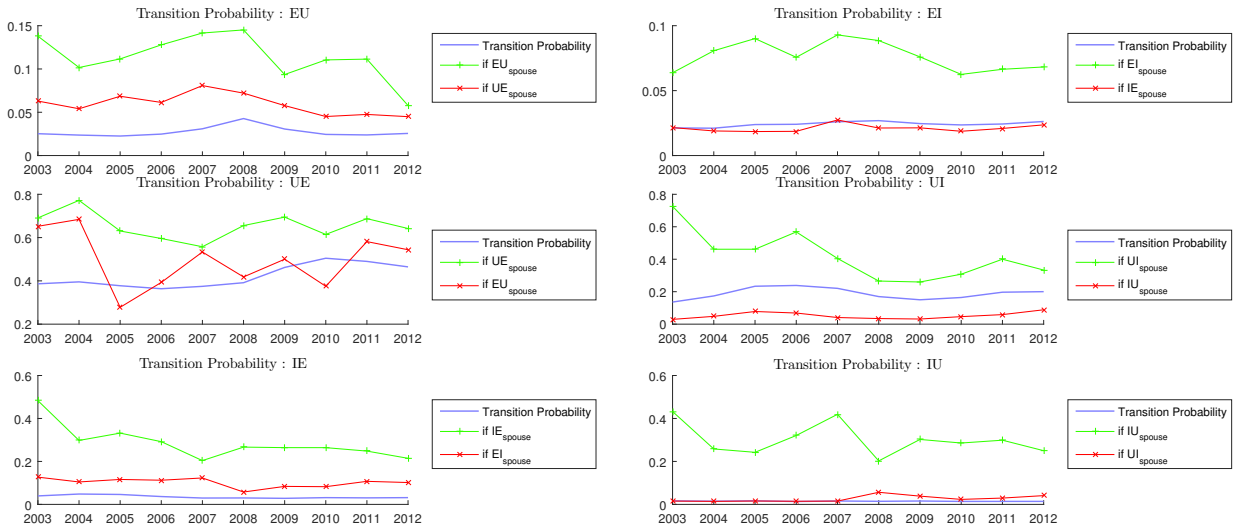
5 Within-Household Labor Market State Transitions

In order to investigate within-household intertemporal labor movements, we next focus on only households with both a household head (a survey-based reference person) and his/her spouse. We examine the intertemporal transitions of the household head (*the spouse*) conditional on the intertemporal movements of the spouse (*the household head*).[22] We illustrate our findings in Figure 4.[23]

[22]We estimate conditional transition probabilities by employing a categorical probit model. On average, 99% of household heads are male, whereas 97% of spouses are female between 2004 and 2013.

[23]In Figure 11 on the Appendix, we display the intertemporal transition probabilities of spouses conditional on household heads' labor market transitions, as well. We report that our findings are qualitatively similar regardless of the conditioning.

Figure 4: Conditional Transition Probabilities: Household Head



In Figure 4, green lines refer to household heads' transition probabilities conditional on spouses' same-directional labor market transitions. For instance, the green line on the bottom left IE panel in Figure 4 displays the probability of an inactive household head to become employed while simultaneously his inactive spouse also becomes employed. Red lines, on the contrary, refer to the respective transition probability of household heads conditional on opposite-directional labor market transition of his spouse.[24] Finally, blue lines refer to unconditional (on spouse behavior) labor market transition probabilities of household heads.

All six panels in Figure 4 depict that household heads and their spouses are more likely engage in same-directional intertemporal labor market transitions. In previous sections, we reported that inactive workers are more likely to participate in the active labor force even as unemployed when the unemployment rate is rising in Turkey. A possible explanation for this phenomenon could have been the within-household risk sharing motives of couples. However, the empirical co-movements we report in Figure 4 do not provide evidence supporting opposite-directional labor market movements, which is to be expected in the presence of within-household intertemporal risk sharing behavior.

6 Conclusions

In this paper we investigate the sources of the negative relationship between the labor force participation and the unemployment rates in Turkish labor market between 2003 - 2012. We first show that contrary to general expectations, the negative relationship is not generated by the discouraged unemployed worker phenomenon. In order to unveil the source of the negative relationship, we rely on Shimer's (2012) methodology, and we calculate hypothetical unemployment and labor force participation rates driven by each of the bi-directional transitions across the three labor markets.

Our results reveal that bi-directional contemporaneous transitions between the employed state and the other two labor market states generate negatively correlated unemployment and

[24] We estimate all labor market transition probabilities of household heads (spouses) conditional on all possible transitions of spouses (household heads) and report our findings for both groups in Figures 12 and 13 on the Appendix.

labor force participation rates. In other words, our findings suggest that the negative relationship occurs due to the simultaneous inflow of workers from inactive and unemployed states to the employed state at times of low unemployment and the outflow of workers from the employed state simultaneously to the inactive and unemployed states at times of high unemployment. Our investigation on the composition of the inflows from and outflows to the employed state provides with the same conclusion, as well. We next investigate whether intertemporal labor market transitions of couples display patterns illustrating within-household risk sharing behavior. We report that this is not the case for Turkey, as across-state transitions of couples tend to be in the same direction.

We believe that while our analyses reveal several salient results on the intertemporal dynamics for the Turkish labor market, data limitations prevent us from exploring intertemporal patterns beyond two years. Further, we believe our preliminary analyses on within-household labor market dynamics are informative, yet not comprehensive, thereby deserving further attention. We leave these to future research.

Appendix

Table 5: Average Annual Transition Matrices, 2003 - 2012

	Total				Male				Female		
	E_{t+1}	U_{t+1}	I_{t+1}		E_{t+1}	U_{t+1}	I_{t+1}		E_{t+1}	U_{t+1}	I_{t+1}
E_t	0.927	0.033	0.039	E_t	0.937	0.036	0.027	E_t	0.903	0.027	0.070
U_t	0.393	0.403	0.205	U_t	0.403	0.387	0.211	U_t	0.353	0.464	0.183
I_t	0.043	0.022	0.935	I_t	0.079	0.037	0.884	I_t	0.029	0.016	0.955

Figure 5: Male Unemployment and Labor Force Participation, 2003 - 2013

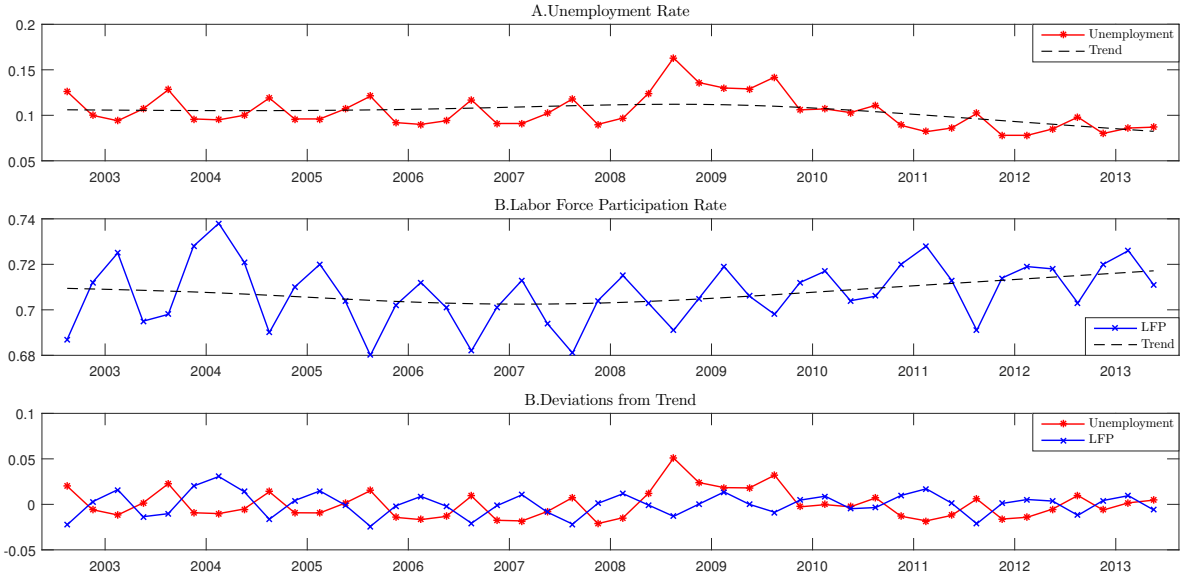


Figure 6: Female Unemployment and Labor Force Participation, 2003 - 2013

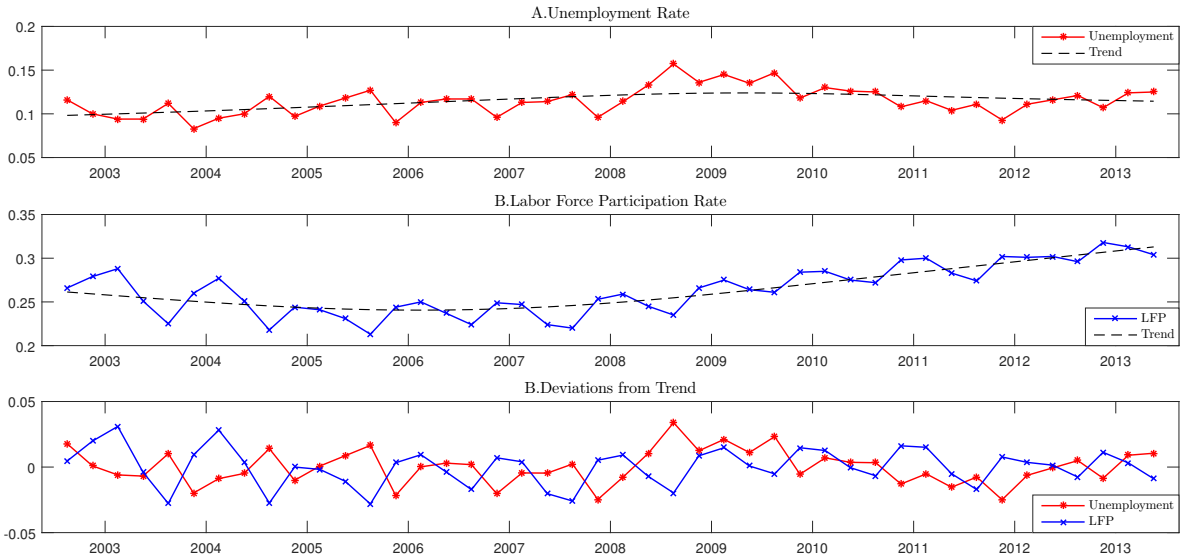


Figure 7: Male Transition Probabilities, 2003 - 2012

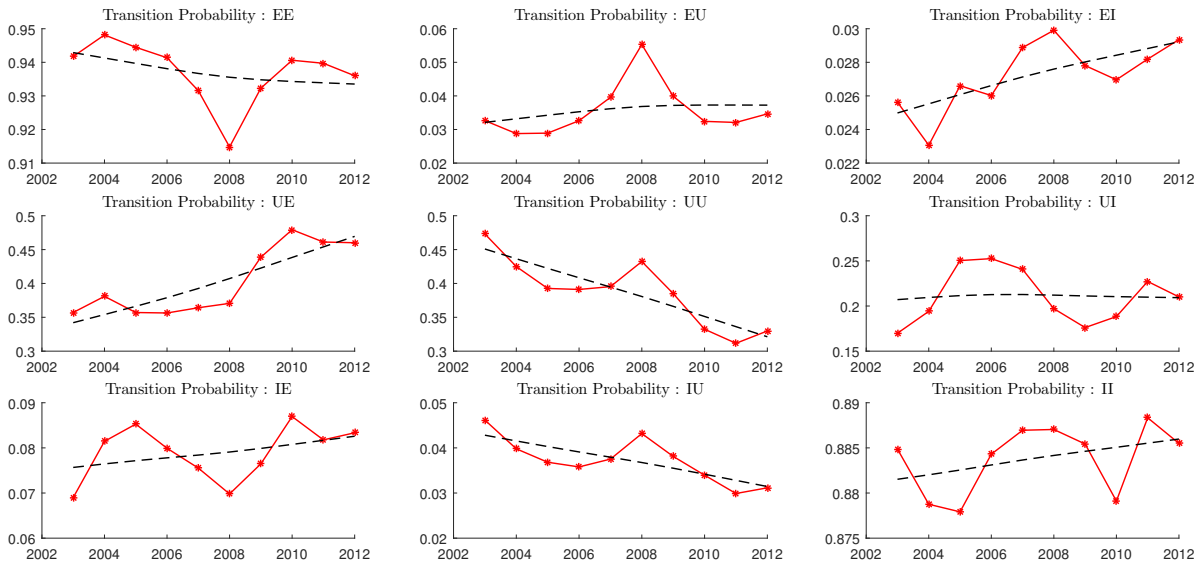


Figure 8: Female Transition Probabilities, 2003 - 2012

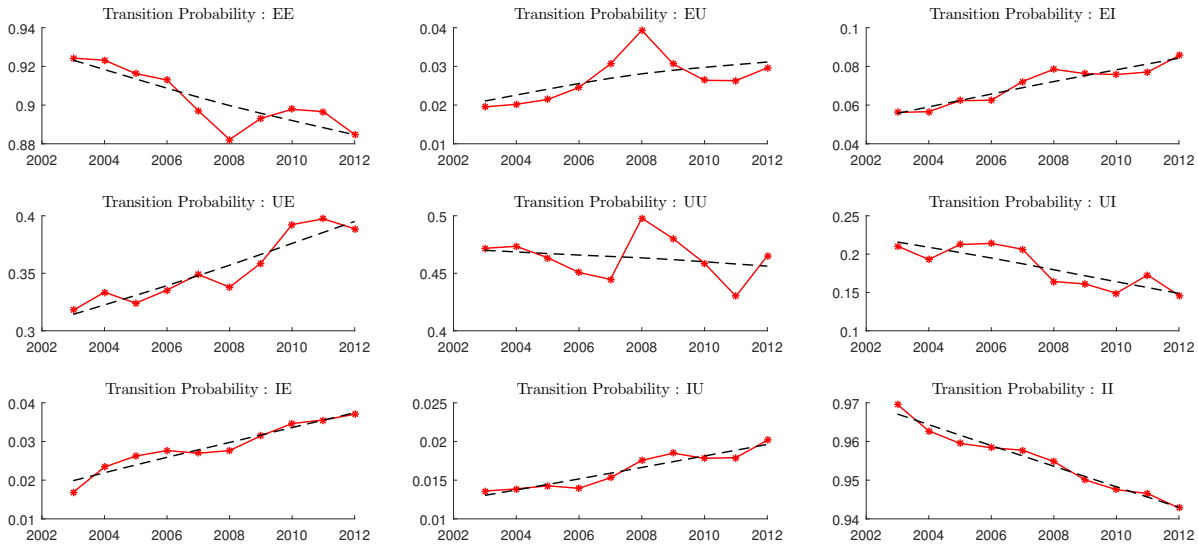


Figure 9: Male Hypothetical Unemployment and LFP Rate, between 2003-2012

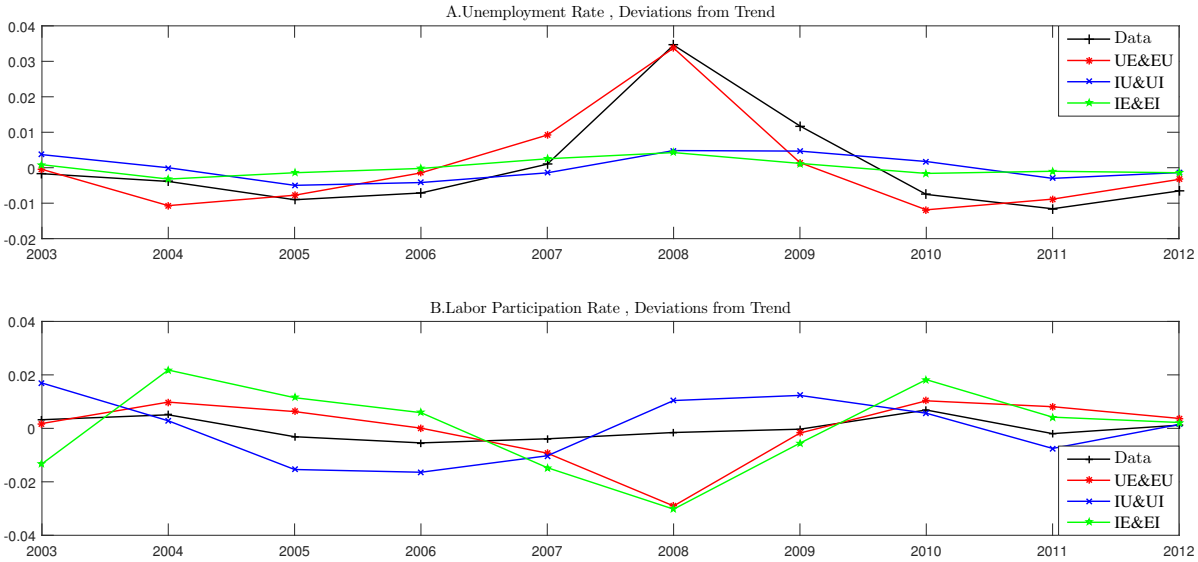


Figure 10: Female Hypothetical Unemployment and LFP Rate, between 2003-2012

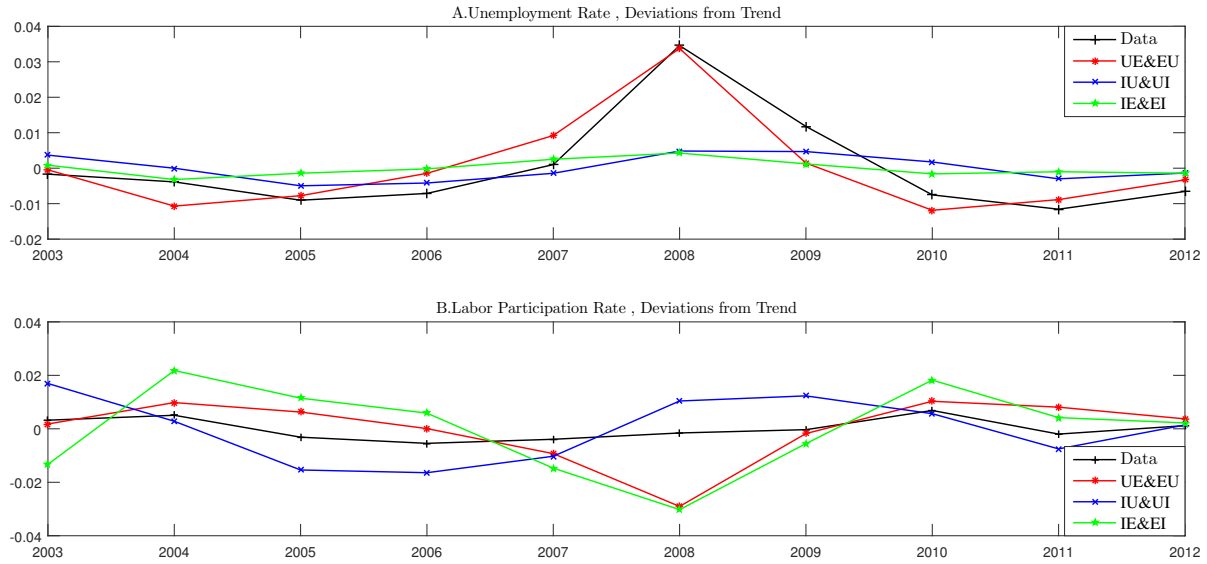


Figure 11: Conditional Transition Probabilities : Spouse

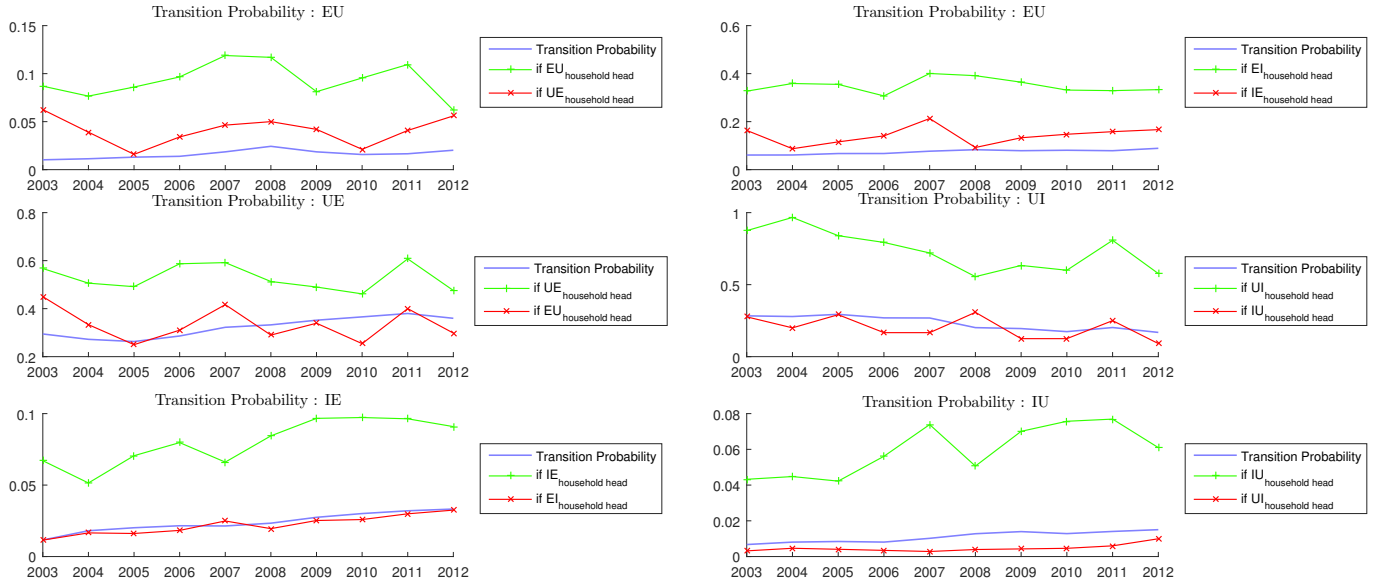


Figure 12: Conditional Transition Probabilities : Household Head

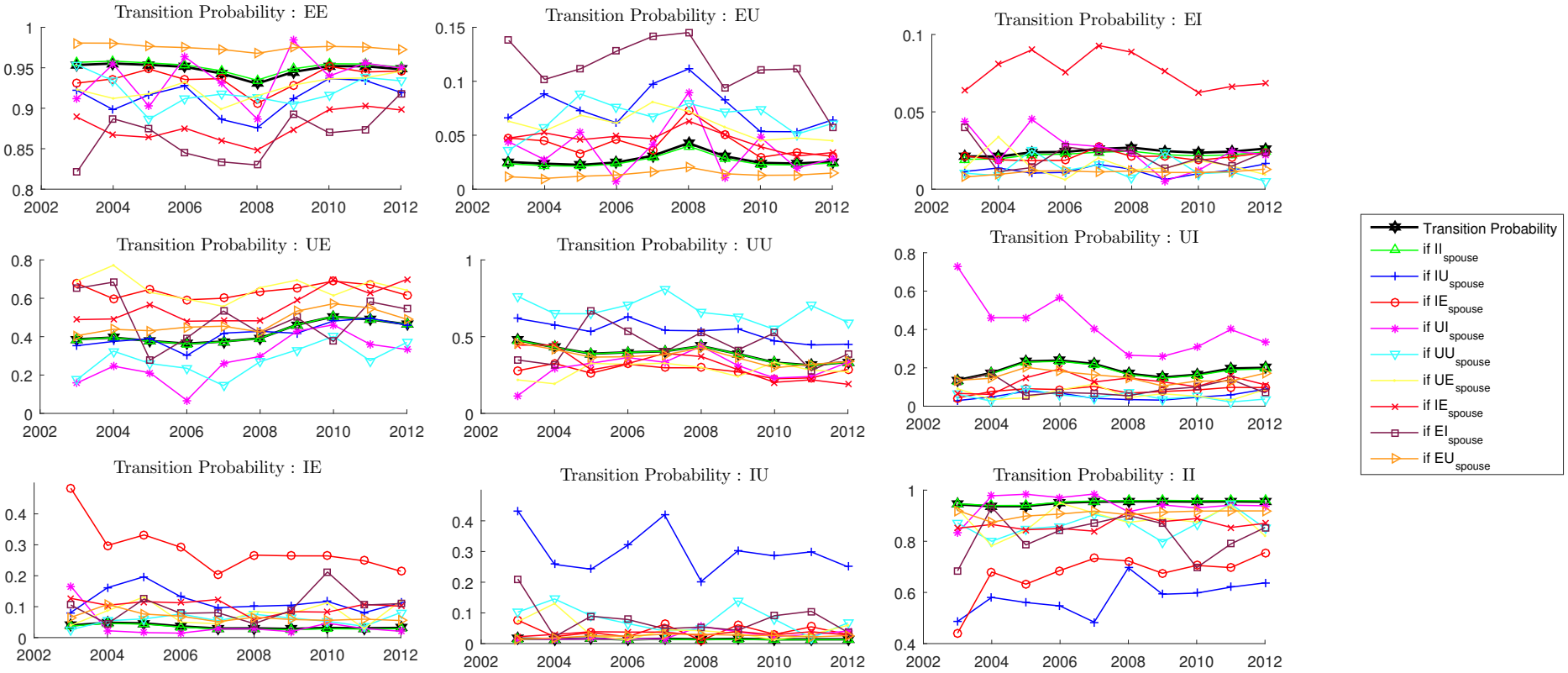
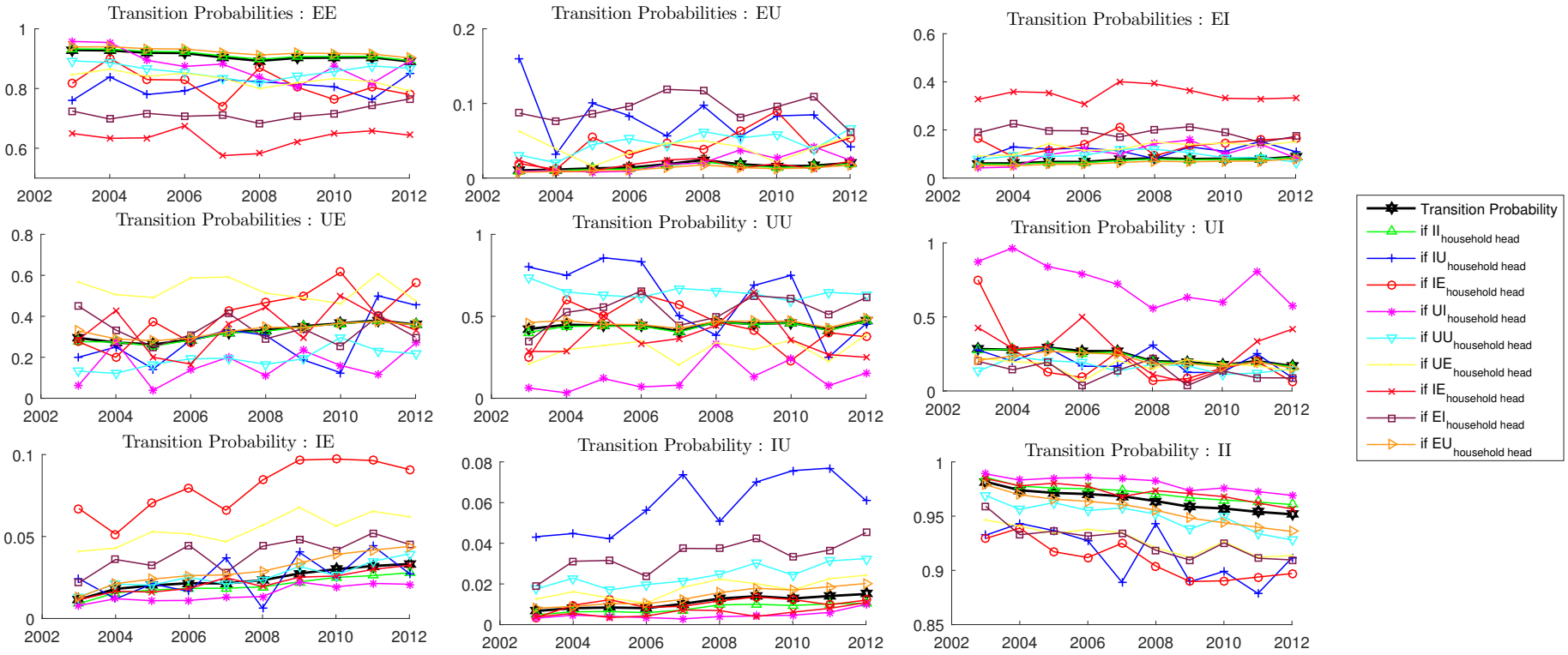


Figure 13: Conditional Transition Probabilities : Spouse



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