ADDED WORKER EFFECT IN TURKEY

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Submitted to the Graduate School of Social Sciences
in partial fulfilment of
the requirements for the degree of Master of Arts

Sabancı University
August 2020

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Date of Approval: Aug 7, 2020

ABSTRACT

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ECONOMICS M.A. THESIS, AUGUST 2020

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Keywords: Labor Force Participation, Unemployment, Added Worker Effect, Turkish Labor Market

The added worker effect (AWE) is the measure of individuals' entry to the labor force when their partners have become unemployed. Unlike the existing literature on Turkish economy, this study does not restrict the impact of the AWE on females. We employ a new method built by Guner, Kulikova, and Valladares-Esteban (2020) to the case of Turkish labor market. We find that the added worker effect has the biggest impact on the labor force participation of married women. The results indicate that the added worker effect reduces the share of couples with neither of their members employed. We find that the added worker effect increases with time and during recessions.

ÖZET

TÜRKİYE'DE İLAVE İŞÇİ ETKİSİ

BİLGE ERTÜRK

EKONOMİ YÜKSEK LİSANS TEZİ, AĞUSTOS 2020

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Anahtar Kelimeler: İşgücüne Katılım, İşsizlik, İlave İşçi Etkisi, Türk İşgücü Piyasası

İlave işçi etkisi, işgücünde olmayan bireylerin, eşlerinin işlerini kaybetmeleri sonucu işgücüne katılmalarının yarattığı etkidir. Türk ekonomisi üzerine varolan literatürün aksine bu çalşma, kadınlar üzerindeki ilave işçi etkisiyle sınırlanmamaktadır. Guner, Kulikova, and Valladares-Esteban (2020) tarafından kurulmuş yeni bir yöntemi Türk işgücü piyasasına uygulamaktayız. Sonuçlarımıza göre, ilave işçi etkisi en çok evli kadınların işgücüne katılımını etkilemektedir. Sonuçlar ilave işçi etkisinin, iki eşin de çalışan olmadığı çiftlerin oranını azalttığını göstermektedir. İlave işçi etkisi zamanla ve ekonomik durgunluklarda artmaktadır.

ACKNOWLEDGEMENTS

I would like to thank my thesis advisor Dr. Remzi Kaygusuz for his helpful and constructive comments. His words of advice have been a great help throughout the process.

Also, I would like to thank the rest of my thesis committee: Dr. İnci Gümüş and Dr. Saadettin Haluk Çitçi for their valuable comments.

I would like to thank my dear friends Başak Kazandır, Barış Kara, Burçin Cenk, Furkan Çetinkaya, Nilüfer Çetik and Yasir Nazlı for all the years of friendship and the support they gave. I thank Arif Yücel, for all his love and support.

Last but not least, I wish to thank my family and my beloved parents Semra Olpak and Süleyman Ertürk for supporting me all my life and believing in me. Without their love, I would not be the person that I am today.

to Mom and Dad

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1. INTRODUCTION

The added worker effect (AWE) refers to the increase in labor force participation due to a member of a married couple entering the labor force in response to the job loss of the partner. Hence, it is an exclusive measure of the coping mechanism of the households to a negative labor market shock when the only employed member becomes unemployed.

In this paper, we employ a newly introduced method by Guner, Kulikova, and Valladares-Esteban (2020) to calculate the impact of the added worker effect in the Turkish labor market. We do this by using the Household Labor Force Survey (HLFS) data collected annually by the Turkish Statistical Institute (TURKSTAT). The sample period contains the years between 2004 and 2019, inclusive. We restrict the sample to married couples living together and all individuals aged between 25 and 54 in order to reduce the effects of schooling and retirement. We extend the standard individual labor market states of employment (E), unemployment (U) and non-participation (O) to nine joint labor market states for couples. To give an example, a couple where the husband is unemployed and the wife is employed is in a UE state. Thus, the first letter will refer to the labor market state of the husband and the second letter will refer to the labor market state of the wife throughout this paper. We calculate the labor market transitions of married couples between these nine joint labor market states and construct $9x9$ Markov transitions matrices which are corrected for the time aggregation bias by a method proposed by Shimer (2012).

Then, we calculate the steady state distributions implied by each Markov transition matrix. We set the transitions related to the added worker effect to zero and recalculate the the steady state distributions. Finally, we aggregate all of the individual labor market stocks of employment, unemployment and out-of the labor force implied by both of the steady state approximations. The differences between the labor market stocks where the added worker effect is in place and the counterfactual scenario where there is no added worker effect gives us the measure of the impact of the added worker effect. We apply this exercise for females only, males only, and finally for all individuals.

The current literature on the added worker effect in the Turkish labor market has so far only measured its impact on female labor force participation by employing empirical identification strategies. This paper distinguishes itself through the methodology it employs to the Turkish data, allowing us to create a counterfactual economy and measure the impact of the added worker effect on any labor market stock.

We calculate the impact of the added worker effect on any individual labor market stock. We find that for the entire sample period we study, the added worker effect increases the female labor force participation by 1.39% and female employment by 1.17%. The impact of the added worker effect has been increasing between 2004 and 2019 in general. For all of the female labor market stocks, the peaks of these impacts occurred between the years 2008 and 2010, which was a response to the increase in male unemployment during this period due to the Great Recession of 2008.[1]

Lastly, we calculate the impact of the added worker effect on joint labor market stocks in which neither of the members is employed (i.e., couples at states UU,UO,OU and OO). The share of couples at these states was 13.26% on average for the entire sample period we study. We find that without the added worker effect the share of couples at these states would have been 0.64 percentage points higher at 13.9%.

This study is related to three areas of the literature. First, it is connected to the large body of empirical research on the added worker effect. Such research can be traced back to Woytinsky (1942). Among these studies, Layard, Barton, and Zabalza (1980); and Maloney (1987) found no significant added worker effect while Lundberg (1985); Spletzer (1997); Stephens (2002); Juhn and Potter (2007); Bredtmann, Otten, and Rulff (2018); Halla, Schmieder, and Weber (2018) found significant effects that varied in magnitude. Mankart and Oikonomou (2016) reported that the AWE has been increasing over the last three decades. For the case of Turkey, Başlevent and Onaran (2003) found a statistically significant added worker effect on the labor force participation of married women for the period of the 1994 Turkish economic crisis. Polat and Saraceno (2010) analyzed the AWE for the 2001 crisis and found significant effects. Finally, Karaoglan and Okten (2012) found that the husband's job loss increases the probability that wife enters the labor market by 4-8% and Degirmenci and Ilkkaracan (2013) found the increase as 6-8% for the sample periods they studied. These empirical studies focused solely on the impact of the AWE on

[1] The increase in male unemployment is presented in Figure A.1 of Appendix A.1 and the magnitudes of the added worker effect are presented in Figure B.2 of Appendix B.2.

the female labor force participation of married woman. Our research adds to these findings by measuring the impact of the added worker effect on various labor market stocks for not only females but also males.

Second, this research is related to the macroeconomics literature that models the joint labor search of couples. Guler, Guvenen, and Violante (2012); Mankart and Oikonomou (2017); Flabbi and Mabli (2018); and Wang (2019) are examples of such studies.

Finally, this work adds to the methodology built by Shimer (2012) and Elsby, Hobijn, and Şahin (1985).

The remainder of the paper is organized as follows. Section 2 presents the details of the data. The adjustments that we made to the transitions are presented in Section 3. Section 4 shows the conditional and joint transitions adjusted for the time aggregation bias. The details of the methodology that we use in order to calculate the added worker effect provided and the results are discussed in Section 5. Section 6 concludes the thesis. The appendices give the detailed presentations of figures and tables and also the correction of the time aggregation bias.

2. DATA

We use the Household Labor Force Survey data collected by the Turkish Statistical Institute.[1] Although the survey is conducted throughout the year, each household is interviewed once in a particular year. Before 2004, there is no way for us to gather information out of the survey about the labor market status of the participants at different times. 2004 onward, the questionnaire included an additional question asking the participants their labor market status in one year before at the same month of the survey. The answers to these question include working at the same job or working at a different job which we categorize as employed, looking for a job which we categorize as unemployed and being a homemaker, retired, student, ill or disabled which we categorize as out-of the labor force. Throughout the analysis, we exploit this particular question in order to calculate the transitions of individuals.

We restrict the sample to the married couples living at the same house where both individuals aged between 25 and 54 in order to reduce the effects of schooling and retirement. The final sample includes the surveys from 2004 to 2019. On average, the sample contains 70,000 couples per year.

Following Guner, Kulikova, and Valladares-Esteban (2020), we extend the individual labor market states of employed (E), unemployed (U) and out-of-labor force (O) to nine joint labor market states. We denote the joint labor market states of the couples by using two letters where the first denotes the husband's labor market state and the second denotes the wife's. For example, OE denotes a couple where the husband is out of the labor force and the wife is employed. So the nine joint labor market states are: $EE, EU, EO, UE, UU, UO, OE, OU, OO$.

[1] TURKSTAT (2020)

3. ADJUSTMENT FOR TIME AGGREGATION BIAS

There are two adjustments standard in the literature to the raw transitions calculated directly from the data. The first is the adjustment for the classification errors proposed by Abowd and Zellner (1985) and Elsby, Hobijn, and Şahin (1985) in order to correct the unlikely reversals of individual labor market states between unemployment and non-participation. To give an example, consider an individual who has been documented in the data as follows: unemployed for two consecutive months, out of the labor force in the third month and unemployed in the fourth month. This reversal to out of the labor force is regarded as a recording error. Hence, in the third month, the individual as re-coded as unemployed.[1] However, since the frequency of the HLFS data is annual rather than monthly, this correction becomes redundant.[2]

The second is the time aggregation bias which we deal in this paper. Due to the data being collected at discrete times, labor market state of an individual could change between two consecutive surveys and this change would not be captured by the data. To give an example, consider an individual recorded as employed in the survey year t, then the individual loses his job, i.e., becomes unemployed and then finds another job and is recorded as employed in the survey year $t+1$. Hence, this transition between the employment and unemployment, and then back to the employment would not be captured by our data.

We follow the methodology proposed by Shimer (2012) and map the discrete time flows to their continuous counterparts and correct for this bias.[3]

After the correction for the time aggregation bias, we construct $9x9$ Markov transition matrices for each year in our sample. These matrices are denoted by Λ_t. An element of Λ_t denoted by $\lambda_{ij,kl}$ gives the probability that a couple moves from state

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[1] See Elsby, Hobijn, and Şahin (1985) and Guner, Kulikova, and Valladares-Esteban (2020) for the correction details.

[2] It is assumed that annual reversals between unemployment and out of labor force are the actual transitions of individuals rather than measurement errors.

[3] The details of this correction can be found in Appendix A.2

ij in the survey year t to state kl in the year $t+1$. Hence, $\lambda_{UE,UU}$ denotes the probability that a couple transits from the state where the husband is unemployed and the wife is employed in the year t to the state where both of them are unemployed in the year $t+1$. We also calculate the individual transition probabilities which are denoted by $\lambda^M_{i,j}$ for men and $\lambda^W_{i,j}$ for women, respectively. Lastly, we calculate the conditional transition probabilities of individuals. We denote these probabilities by $\lambda^M_{i,j|k,l}$ for men and $\lambda^W_{i,j|k,l}$ for women, respectively. Thus, $\lambda^W_{E,U|O,E}$ gives the probability that an employed wife transits to unemployment conditional on her husband moving from non-participation to employment.

4. TRANSITIONS

In this section, we present both the average joint and conditional labor market transitions of married couples.[1] Table 4.1 documents the average conditional labor market transition probabilities of married couples.

There are a couple of observations to be made here. First, we can observe gender differences in these transition probabilities. On average, men are more likely to stay employed than women. Regardless of their partners' transitions, men are more attached to employment:

$$\lambda^M_{EE|kl} \geq \lambda^W_{EE|kl} \quad \text{for all} \quad k, l \tag{4.1}$$

Also, men are less likely to become a non-participant regardless of their partners' transitions. Hence, women are more likely to transit to out-of labor force than men:

$$\lambda^M_{iO|kl} \leq \lambda^W_{iO|kl} \quad \text{for all} \quad i, k, l \tag{4.2}$$

Second, we can observe the added worker effect, which is the increase in the labor force participation of individuals in response to a job loss of their partners. A non-participant individual is more likely to enter the labor force when the partner transits from employment to unemployment than when the partner stays employed.

The probability that a non-participant woman entering the labor force whose husband loses his job (moving from employment to unemployment) is 9.11% (4.9% as employed and 4.21% as unemployed) whereas the probability of entering the labor force is 6.12% (3.98% as employed and 2.14% as unemployed) when her husband keeps his job:

$$\lambda^W_{OE|EU} + \lambda^W_{OU|EU} \geq \lambda^W_{OE|EE}\lambda^W_{OU|EE} \tag{4.3}$$

[1] The table of the average joint labor market transitions can be found in Appendix A.3.

The probability that a non-participant man entering the labor force whose wife loses her job (moving from employment to unemployment) is 16.83% (9.48% as employed and 7.35% as unemployed) whereas the probability of entering the labor force is 13.77% (9.57% as employed and 4.2% as unemployed) when his wife keeps his job:

$$\lambda^M_{OE|EU} + \lambda^M_{OU|EU} \geq \lambda^M_{OE|EE} \lambda^M_{OU|EE} \tag{4.4}$$

Male transitions		Female employed E	U	O	Female unemployed E	U	O	Female OLF E	U	O
	E	96.39	2.37	1.22	82.23	15.71	2.04	87.59	7.05	5.35
Female employed	U	50.53	35.27	14.18	54.60	39.34	6.04	58.46	27.11	14.41
	O	9.57	4.20	86.22	9.48	7.35	83.16	12.99	4.91	82.09
	E	88.77	9.55	1.67	91.41	7.34	1.23	92.74	5.03	2.22
Female unemployed	U	67.17	26.12	6.70	33.90	61.94	4.14	30.81	30.31	38.87
	O	8.42	5.14	86.42	9.53	11.12	79.33	7.87	3.59	88.52
	E	90.62	6.89	2.47	89.24	9.42	1.32	93.00	4.45	2.53
Female OLF	U	66.36	25.16	8.47	44.32	48.56	7.11	43.41	36.82	19.76
	O	30.94	5.59	63.46	12.80	29.09	58.10	7.87	4.07	88.05

NOTE: HLFS 2004-2019. All agents aged 25-54. Upper table shows the average transition probabilities of women conditional on their husbands' transitions from the states in the rows to the states in the columns. Lower table shows the same for men. E denotes employment, U denotes unemployment and O denotes out of the labor force.

Finally, consider the probability that a woman(man) transits from state i to j conditional on her(his) husband(wife) transits just the same, i.e. from state i to state j. This carries the highest probability compared to probability that the husband(wife) transits from state k to state l where $kl \neq ij$:

$$\lambda^W_{ij|ij} \geq \lambda^W_{ij|kl} \quad \text{for all} \quad k, l \tag{4.5}$$

$$\lambda^M_{ij|ij} \geq \lambda^M_{ij|kl} \quad \text{for all} \quad k, l \tag{4.6}$$

Consider a woman that transits from non-participation to employment. If her husband also transits from non-participation to employment, then this conditional transition probability (10.12%) is the highest compared to another transition of the husband. To give a few examples, the probability that a woman moves from O to E conditional on her husband transiting from O to U is 3.67%, conditional on her husband transiting from E to U is 4.9% and her husband transiting from U to E is 6.53%. Men have the same feature as women. The probability of the husband moving from O to E is highest when his wife also moves from O to E.

5. MEASURING THE ADDED WORKER EFFECT

In this section, we present the methodology that we use in order to calculate the added worker effect and the results. The added worker effect transitions are such that one of the partners loses his/her job (E to U) or stays unemployed (U to U) and the out of the labor force spouse enters to labor force either as either employed (O to E) or unemployed (O to U). If the wife is the one entering the labor force, these transitions are: EO to UE, EO to UU, UO to UE, and UO to UU and if the husband is the one entering the labor force, these transitions are: OE to EU, OE to UU, OU to EU, and OU. Hence, by setting these transitions to zero, we can measure the added worker effect on any individual labor market stock.

We follow the methodology built by Guner, Kulikova, and Esteban(2020) and apply it to the case of Turkish labor market. First, we calculate the Markov transition probabilities Λ_t for each year in our sample which we correct for the time aggregation bias in order to calculate the steady state vector of this Markov chain. We denote the share of couples at state ij at time t as n_{ij} and the steady state vector as $\bar{n}$. In the steady state the following condition holds:

(5.1)

$$\underbrace{\begin{bmatrix} n_{EE} \\ n_{EU} \\ n_{EO} \\ n_{UE} \\ n_{UU} \\ n_{UO} \\ n_{OE} \\ n_{OU} \\ n_{OO} \end{bmatrix}_t}_{\bar{n}} \times \underbrace{\begin{bmatrix} \lambda_{EE}^{EE} & \lambda_{EE}^{EU} & \lambda_{EE}^{EO} & \lambda_{EE}^{UE} & \lambda_{EE}^{UU} & \lambda_{EE}^{UO} & \lambda_{EE}^{OE} & \lambda_{EE}^{OU} & \lambda_{EE}^{OO} \\ \lambda_{EU}^{EE} & \lambda_{EU}^{EU} & \lambda_{EU}^{EO} & \lambda_{EU}^{UE} & \lambda_{EU}^{UU} & \lambda_{EU}^{UO} & \lambda_{EU}^{OE} & \lambda_{EU}^{OU} & \lambda_{EU}^{OO} \\ \lambda_{EO}^{EE} & \lambda_{EO}^{EU} & \lambda_{EO}^{EO} & \lambda_{EO}^{UE} & \lambda_{EO}^{UU} & \lambda_{EO}^{UO} & \lambda_{EO}^{OE} & \lambda_{EO}^{OU} & \lambda_{EO}^{OO} \\ \lambda_{UE}^{EE} & \lambda_{UE}^{EU} & \lambda_{UE}^{EO} & \lambda_{UE}^{UE} & \lambda_{UE}^{UU} & \lambda_{UE}^{UO} & \lambda_{UE}^{OE} & \lambda_{UE}^{OU} & \lambda_{UE}^{OO} \\ \lambda_{UU}^{EE} & \lambda_{UU}^{EU} & \lambda_{UU}^{EO} & \lambda_{UU}^{UE} & \lambda_{UU}^{UU} & \lambda_{UU}^{UO} & \lambda_{UU}^{OE} & \lambda_{UU}^{OU} & \lambda_{UU}^{OO} \\ \lambda_{UO}^{EE} & \lambda_{UO}^{EU} & \lambda_{UO}^{EO} & \lambda_{UO}^{UE} & \lambda_{UO}^{UU} & \lambda_{UO}^{UO} & \lambda_{UO}^{OE} & \lambda_{UO}^{OU} & \lambda_{UO}^{OO} \\ \lambda_{OE}^{EE} & \lambda_{OE}^{EU} & \lambda_{OE}^{EO} & \lambda_{OE}^{UE} & \lambda_{OE}^{UU} & \lambda_{OE}^{UO} & \lambda_{OE}^{OE} & \lambda_{OE}^{OU} & \lambda_{OE}^{OO} \\ \lambda_{OU}^{EE} & \lambda_{OU}^{EU} & \lambda_{OU}^{EO} & \lambda_{OU}^{UE} & \lambda_{OU}^{UU} & \lambda_{OU}^{UO} & \lambda_{OU}^{OE} & \lambda_{OU}^{OU} & \lambda_{OU}^{OO} \\ \lambda_{OO}^{EE} & \lambda_{OO}^{EU} & \lambda_{OO}^{EO} & \lambda_{OO}^{UE} & \lambda_{OO}^{UU} & \lambda_{OO}^{UO} & \lambda_{OO}^{OE} & \lambda_{OO}^{OU} & \lambda_{OO}^{OO} \end{bmatrix}_t}_{\Lambda_t} = \underbrace{\begin{bmatrix} n_{EE} \\ n_{EU} \\ n_{EO} \\ n_{UE} \\ n_{UU} \\ n_{UO} \\ n_{OE} \\ n_{OU} \\ n_{OO} \end{bmatrix}_t}_{\bar{n}}$$

Some couples move from the state ij out to the state kl between the years t and $t+1$ and some couples move from the state kl in to the state ij between the years t and $t+1$. The above condition implies that the ins and outs of a state should cancel each other out in the steady state:

$$\underbrace{(\sum_{kl \neq ij} \lambda_{ij,kl}) n_{ij}}_{\text{outflows}} = \underbrace{\sum_{kl \neq ij} \lambda_{kl,ij} n_{kl}}_{\text{inflows}} \tag{5.2}$$

We calculate the fraction of couples at each state implied by the joint transition probabilities at each year in our data by solving the above equation.[1] Since the steady state approximations are close enough to the data, we use these stocks to calculate the added worker effect.

Second, we set the transitions related to the added worker effect to zero and calculate the steady state vector n^{noAWE}.[2] Then, we aggregate the joint stocks of n_{ij} and n_{ij}^{noAWE} to the individual labor market stocks of E,U and P, and E^{noAWE},U^{noAWE} and P^{noAWE}. The differences between these individual labor market stocks give us the added worker effect. We check the impact of the added worker effect on employment rate ($\frac{E}{E+U+O}$), unemployment rate ($\frac{U}{U+E}$) and participation rate ($\frac{E+U}{E+U+O}$).

5.1 Results

Table 5.1 presents the results of our calculations of the added worker effect. As noted before, by setting the transitions related to the added worker effect and thus, creating a counterfactual environment, we diverge from the empirical studies where they could only extract the impact of the added worker effect on female labor force participation. This method enables us to check the impact of the added worker effect on any labor market stock for all individuals.

In order to understand and compare the magnitudes of the resulting added worker effect, Table 5.2 presents the actual shares of each individual labor market stock calculated directly from the data.

[1] We present the figures of the actual labor market stocks we calculate from the data and the steady state approximations for comparison in Appendix B.1.

[2] When a particular joint transition related to the AWE is set to zero, the couples are assumed to stay in their initial states.

We present the average of the entire sample period from 2003 to 2019, and also split the period into five year intervals and present the averages. For the entire sample i.e., all individuals, the added worker effect increases the participation rate by 0.88 percentage points to 40.41%. Without the added worker effect, the employment would have been 0.64 percentage points lower at 55.4%. We observe that the biggest impact of the added worker effect is on female labor force participation by 1.39 percentage points. The female employment would have been 1.17 percentage points lower without the added worker effect. There is a non-negligible impact of the added worker effect on male participation and employment as well.

We observe that impact of the added worker effect has been increasing almost in every labor market stock. We can interpret this increase as a coping mechanism of the households with the economic crises that Turkey had to deal with since the Great Recession of 2008[3] and to the latest currency crisis that continues as of today. Also, the increase in the education levels of women and the rapid urbanization of the population are the possible contributing factors to the increase of the added worker effect.

The numbers are in line with the results reported by Guner, Kulikova, and Valladares-Esteban (2020), though the magnitudes are lower. This can be explained by a couple of things. First, the persistence of the traditional household in which the husband is the breadwinner and the wife is out of the labor force in Turkey is higher than in US. Second, the education levels of women in Turkey is lower than in US. Together, these factors result in lower added worker effects in Turkey.

5.2 The Importance of The Added Worker Effect

How can we interpret these measures of the added worker effect? Turkey had the lowest female labor force participation among the OECD countries for decades. Though, since 2004 it has been increasing steadily starting from 26% in 2004 to

[3]There are additional impacts from the labor demand side. The Turkish government took measures to recover the increasing unemployment during 2008 (Degirmenci and Ilkkaracan (2013)). The social security premiums of female workers were paid by the government for a period of time which they claim in turn, increased the female employment despite the crisis.

NOTE: HLFS 2004-2019. All agents aged 25-54. The results in this table presents the calculated added worker effect by shutting the AWE transitions zero and then subtracting the resulting individual labor stocks from the data. All in percentage points. In the upper panel we shut down all the AWE transitions to zero and present the results for all individuals. In the middle panel we shut down the AWE transitions related to the males' AWE: OE to EU, OE to UU, OU to EU, and OU to UU and in the lower panel we shut down the AWE transitions related to the females' AWE: EO to UE, EO to UU, UO to UE, and UO to UU.

Table 5.1 Added Worker Effect for Individual Labor Market Stocks

	2003-2019	2003-2008	2008-2014	2014-2019
All				
Participation Rate	0.88	0.79	0.94	0.91
Employment Rate	0.64	0.62	0.69	0.58
Unemployment Rate	0.29	0.21	0.28	0.39
Males				
Participation Rate	0.40	0.25	0.40	0.53
Employment Rate	0.34	0.21	0.36	0.45
Unemployment Rate	0.02	0.02	0.01	0.04
Females				
Participation Rate	1.39	1.35	1.41	1.39
Employment Rate	1.17	1.19	1.20	1.12
Unemployment Rate	0.19	0.19	0.17	0.22

NOTE: HLFS 2004-2019. All agents aged 25-54. The upper panel gives the means of the labor market stocks for all individuals calculated directly from the data. The middle panel gives these for men and lower panel for women.

Table 5.2 Shares of Individual Labor Market Stocks

	2003-2019	2003-2008	2008-2014	2014-2019
All				
Participation Rate	40.41%	55.77%	60.55%	64.89%
Employment Rate	56.04%	51.92%	56.17%	60.01%
Unemployment Rate	7.23%	6.90%	7.27%	7.52%
Males				
Participation Rate	90.33%	88.51%	90.43%	92.05%
Employment Rate	84.09%	82.10%	84.11%	86.07%
Unemployment Rate	6.92%	7.24%	7.00%	6.50%
Females				
Participation Rate	32.24%	24.32%	32.37%	40.01%
Employment Rate	29.64%	22.93%	29.82%	36.14%
Unemployment Rate	7.77%	5.70%	7.94%	9.65%

41% in 2019[4]. The traditional family structure where the household head works and the wife is out of the labor force has been slowly shifting during our sample period. In 2004, 60.7% of the married couples consisted of an employed husband and a non

[4]The numbers are based on the Household Labor Force Survey (HLFS)

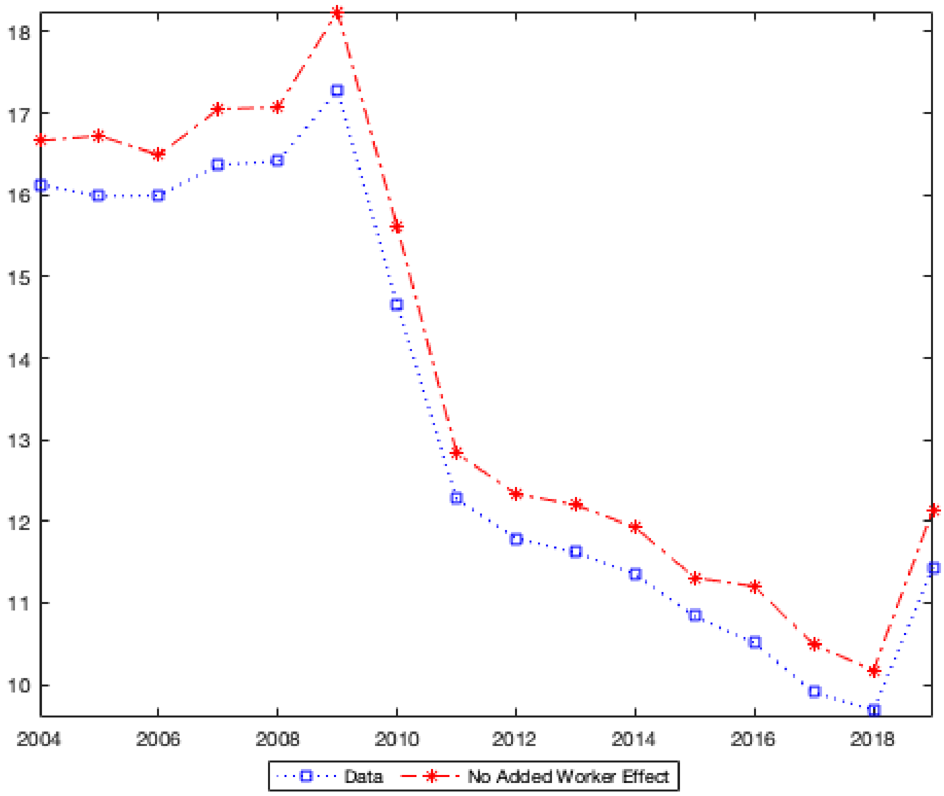
participant wife whereas 20.2% of the married couples had both members employed. In 2019, 45.8% of the married couples consisted of an employed husband and a non participant wife whereas 33.3% of the married couples had both members employed. There is about a 15 percentage points decrease in the fraction of traditional households and a 13 percentage points increase in the fraction of households with both members employed. It is safe to say that the structure of the households shifted in a way that the couples moved from EO state to EE state. There has been also an increase in the fraction of non-traditional households where the roles of the partners have been reversed such that the husband is the housekeeper and the wife is the worker. In 2004, these households were 1.2% of the whole sample and in 2019, by almost tripling it has increased to 3.4%.

As noted by Guner, Kulikova, and Valladares-Esteban (2020), these features show that the couples do not decide their labor market outcomes separately but rather jointly. However, all the statistics regarding the labor market stocks have been presented at the individual level. Though TURKSTAT distinguishes these statistics according to gender, age and marital status, without the micro-level data one cannot obtain the statistics regarding the joint labor market decisions that couples make that we present here.

The main feature of the added worker effect is that the negative labor market shocks are smoothed out by the couples: when an employed member becomes unemployed, the partner who is out of the labor force can enter the labor force. This way, the decrease in income can be offset by the new worker in the household. This means that the added worker effect helps households to have at least one employed member and thus, reducing the number of households with neither of the members employed. To see if this is in fact the case, we present in Figure 5.1 the share of households with both members non-employed (the couples at states UU,UO,OU and OO) both as in the data where the added worker effect is in place and in the counterfactual case where we shut down the added worker effect.The dotted blue line represents the share of households where both members non-employed as in the data and the red dashed line represents it when there is no added worker effect. The average share of households with no employed members is 13.26% in the data, this share increases to 13.9% when there is no added worker effect. This 0.64 percentage point increase accounts for the 4.8% of the couples with both members non-employed.

NOTE: HLFS 2004-2019. All agents aged 25-54. .The dotted blue line represents the share of households where both members non-employed as in the data and the red dashed line represents it when there is no added worker effect.

Figure 5.1 Share of couples with both members non-employed



6. CONCLUSION

In this paper, we try to examine the impact of the added worker effect on labor market outcomes. To do this, we apply a new method built by Guner, Kulikova, and Valladares-Esteban (2020) on the Turkish labor market data. This method allows us to create a counterfactual economy and eliminate the added worker effect to see the magnitude of its impact on any labor market stock.

Our results indicate that the added worker effect has the biggest impact on female labor force participation on average. There are non-negligible effects on male labor market outcomes as well. We find that the impact of the added worker effect increases through out our sample period and we see the peak of the impact during the Great Recession of 2008.

Added worker effect allows couples to smooth negative labor market shocks and cope with related income losses. We show that the added worker effect reduces the share of couples with both members non-employed. The share of such households would have been 4.8% higher without the added worker effect.

It is clear that the traditional structure of the Turkish family has been steadily changing over the last 15 years. With the availability of a monthly data in the future, this method can be applied and the added worker effect in Turkey could be measured and documented even more accurately.

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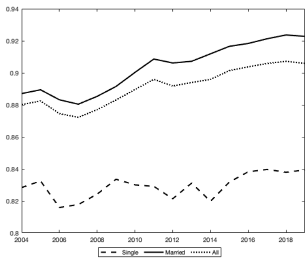
APPENDIX A

A.1 Data Details

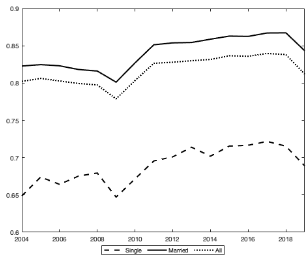
This appendix presents the shares of individual labor market states for married and single individuals and for all males and females. Participation rate is calculated as $P-rate = \dfrac{E+U}{E+U+O}$, employment rate as $E-rate = \dfrac{E}{E+U+O}$ and unemployment rate as $U-rate = \dfrac{U}{U+E}$.

Figure A.1 Labor Market Stocks of Individuals According to Marital Status

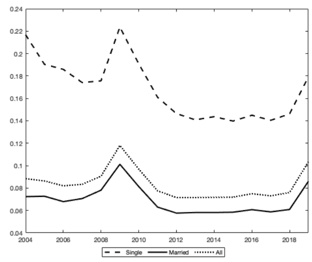
(a) Men-Participation



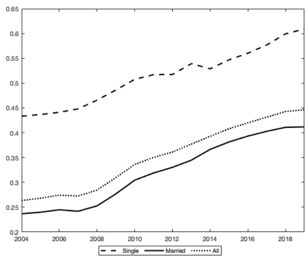
(b) Men-Employment



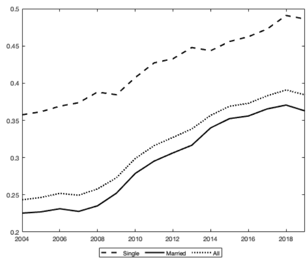
(c) Men-Unemployment



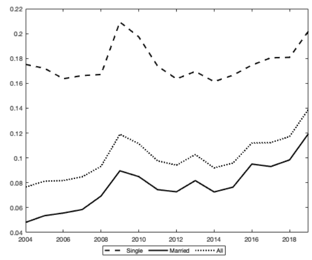
(d) Women-Participation



(e) Women-Employment



(f) Women-Unemployment



NOTE: HLFS 2004-2019. All agents aged 25-54. Dotted line represents all individuals, dashed line represents single individuals and solid line represents married individuals.

A.2 Correction for Time Aggregation Bias

The frequency of the HLFS data is annual. This results in a situation that at any time between two consecutive surveys, the labor market status' of individuals could change and this would not be captured by the data. To give an example to demonstrate this: consider an individual who has been recorded as employed in the survey year t, then loses her job but finds a new job before the survey year $t+1$, thus, she would be recorded as employed in $t+1$. Hence, this transition to unemployment and then to employment cannot be recorded in the data. This bias could be solved by the method proposed by Shimmer(2012) where one can map the discrete time flows to their respective continuous time transitions. Elsby, Hobijn and Sahin(2015) show that this method can be summarized as a simple eigen-value decomposition which we present here.

Consider Θ which is the discrete flows that we calculate directly from the HLFS data and its continuous transition matrix Λ. Both discrete and continuous transition matrices should generate the same steady state, hence we can infer the latter by the former.

Let $n = (EE, EU, EO, UE, UU, UO, OE, OU, OO)$ be the vector of nine possible joint labor market states for the couples and the associated probability distribution. Hence, $n_t = \Theta_t n_t - 1$, that is:

(A.1)

$$\underbrace{\begin{bmatrix} EE \\ EU \\ EO \\ UE \\ UU \\ UO \\ OE \\ OU \\ OO \end{bmatrix}_t}_{n_t} = \underbrace{\begin{bmatrix}
\theta_{EE}^{EE} & \theta_{EU}^{EE} & \theta_{EO}^{EE} & \theta_{UE}^{EE} & \theta_{UU}^{EE} & \theta_{UO}^{EE} & \theta_{OE}^{EE} & \theta_{OU}^{EE} & \theta_{OO}^{EE} \\
\theta_{EE}^{EU} & \theta_{EU}^{EU} & \theta_{EO}^{EU} & \theta_{UE}^{EU} & \theta_{UU}^{EU} & \theta_{UO}^{EU} & \theta_{OE}^{EU} & \theta_{OU}^{EU} & \theta_{OO}^{EU} \\
\theta_{EE}^{EO} & \theta_{EU}^{EO} & \theta_{EO}^{EO} & \theta_{UE}^{EO} & \theta_{UU}^{EO} & \theta_{UO}^{EO} & \theta_{OE}^{EO} & \theta_{OU}^{EO} & \theta_{OO}^{EO} \\
\theta_{EE}^{UE} & \theta_{EU}^{UE} & \theta_{EO}^{UE} & \theta_{UE}^{UE} & \theta_{UU}^{UE} & \theta_{UO}^{UE} & \theta_{OE}^{UE} & \theta_{OU}^{UE} & \theta_{OO}^{UE} \\
\theta_{EE}^{UU} & \theta_{EU}^{UU} & \theta_{EO}^{UU} & \theta_{UE}^{UU} & \theta_{UU}^{UU} & \theta_{UO}^{UU} & \theta_{OE}^{UU} & \theta_{OU}^{UU} & \theta_{OO}^{UU} \\
\theta_{EE}^{UO} & \theta_{EU}^{UO} & \theta_{EO}^{UO} & \theta_{UE}^{UO} & \theta_{UU}^{UO} & \theta_{UO}^{UO} & \theta_{OE}^{UO} & \theta_{OU}^{UO} & \theta_{OO}^{UO} \\
\theta_{EE}^{OE} & \theta_{EU}^{OE} & \theta_{EO}^{OE} & \theta_{UE}^{OE} & \theta_{UU}^{OE} & \theta_{UO}^{OE} & \theta_{OE}^{OE} & \theta_{OU}^{OE} & \theta_{OO}^{OE} \\
\theta_{EE}^{OU} & \theta_{EU}^{OU} & \theta_{EO}^{OU} & \theta_{UE}^{OU} & \theta_{UU}^{OU} & \theta_{UO}^{OU} & \theta_{OE}^{OU} & \theta_{OU}^{OU} & \theta_{OO}^{OU} \\
\theta_{EE}^{OO} & \theta_{EU}^{OO} & \theta_{EO}^{OO} & \theta_{UE}^{OO} & \theta_{UU}^{OO} & \theta_{UO}^{OO} & \theta_{OE}^{OO} & \theta_{OU}^{OO} & \theta_{OO}^{OO}
\end{bmatrix}_t}_{\Theta_t} \times \underbrace{\begin{bmatrix} EE \\ EU \\ EO \\ UE \\ UU \\ UO \\ OE \\ OU \\ OO \end{bmatrix}_{t-1}}_{n_{t-1}}$$

where θ_{ij}^{kl} denotes the transition probability that a couple moves from state ij to state kl. It is clear that

$$\theta_{ij}^{ij} = 1 - \sum_{kl \neq ij} \theta_{ij}^{kl}$$

Since n is a probability distribution, it is normalized. Hence, nine joint states give the shares of the population, i.e. $EE+EU+EO+UE+UU+UO+OE+OU+OO=1$, one can transform the above nine dimensional system into eight dimensions by substituting the state OO.

(A.2)

$$\underbrace{\begin{bmatrix} EE \\ EU \\ EO \\ UE \\ UU \\ UO \\ OE \\ OU \\ OO \end{bmatrix}_t}_{n_t} = \underbrace{\begin{bmatrix}
\theta^{EE}_{EE}-\theta^{EE}_{OO} & \theta^{EE}_{EU}-\theta^{EE}_{OO} & \theta^{EE}_{EO}-\theta^{EE}_{OO} & \theta^{EE}_{UE}-\theta^{EE}_{OO} & \theta^{EE}_{UU}-\theta^{EE}_{OO} & \theta^{EE}_{UO}-\theta^{EE}_{OO} & \theta^{EE}_{OE}-\theta^{EE}_{OO} & \theta^{EE}_{OU}-\theta^{EE}_{OO} & \theta^{EE}_{OO}-\theta^{EE}_{OO} \\
\theta^{EU}_{EE}-\theta^{EU}_{OO} & \theta^{EU}_{EU}-\theta^{EU}_{OO} & \theta^{EU}_{EO}-\theta^{EU}_{OO} & \theta^{EU}_{UE}-\theta^{EU}_{OO} & \theta^{EU}_{UU}-\theta^{EU}_{OO} & \theta^{EU}_{UO}-\theta^{EU}_{OO} & \theta^{EU}_{OE}-\theta^{EU}_{OO} & \theta^{EU}_{OU}-\theta^{EU}_{OO} & \theta^{EU}_{OO}-\theta^{EU}_{OO} \\
\theta^{EO}_{EE}-\theta^{EO}_{OO} & \theta^{EO}_{EU}-\theta^{EO}_{OO} & \theta^{EO}_{EO}-\theta^{EO}_{OO} & \theta^{EO}_{UE}-\theta^{EO}_{OO} & \theta^{EO}_{UU}-\theta^{EO}_{OO} & \theta^{EO}_{UO}-\theta^{EO}_{OO} & \theta^{EO}_{OE}-\theta^{EO}_{OO} & \theta^{EO}_{OU}-\theta^{EO}_{OO} & \theta^{EO}_{OO}-\theta^{EO}_{OO} \\
\theta^{UE}_{EE}-\theta^{UE}_{OO} & \theta^{UE}_{EU}-\theta^{UE}_{OO} & \theta^{UE}_{EO}-\theta^{UE}_{OO} & \theta^{UE}_{UE}-\theta^{UE}_{OO} & \theta^{UE}_{UU}-\theta^{UE}_{OO} & \theta^{UE}_{UO}-\theta^{UE}_{OO} & \theta^{UE}_{OE}-\theta^{UE}_{OO} & \theta^{UE}_{OU}-\theta^{UE}_{OO} & \theta^{UE}_{OO}-\theta^{UE}_{OO} \\
\theta^{UU}_{EE}-\theta^{UU}_{OO} & \theta^{UU}_{EU}-\theta^{UU}_{OO} & \theta^{UU}_{EO}-\theta^{UU}_{OO} & \theta^{UU}_{UE}-\theta^{UU}_{OO} & \theta^{UU}_{UU}-\theta^{UU}_{OO} & \theta^{UU}_{UO}-\theta^{UU}_{OO} & \theta^{UU}_{OE}-\theta^{UU}_{OO} & \theta^{UU}_{OU}-\theta^{UU}_{OO} & \theta^{UU}_{OO}-\theta^{UU}_{OO} \\
\theta^{UO}_{EE}-\theta^{UO}_{OO} & \theta^{UO}_{EU}-\theta^{UO}_{OO} & \theta^{UO}_{EO}-\theta^{UO}_{OO} & \theta^{UO}_{UE}-\theta^{UO}_{OO} & \theta^{UO}_{UU}-\theta^{UO}_{OO} & \theta^{UO}_{UO}-\theta^{UO}_{OO} & \theta^{UO}_{OE}-\theta^{UO}_{OO} & \theta^{UO}_{OU}-\theta^{UO}_{OO} & \theta^{UO}_{OO}-\theta^{UO}_{OO} \\
\theta^{OE}_{EE}-\theta^{OE}_{OO} & \theta^{OE}_{EU}-\theta^{OE}_{OO} & \theta^{OE}_{EO}-\theta^{OE}_{OO} & \theta^{OE}_{UE}-\theta^{OE}_{OO} & \theta^{OE}_{UU}-\theta^{OE}_{OO} & \theta^{OE}_{UO}-\theta^{OE}_{OO} & \theta^{OE}_{OE}-\theta^{OE}_{OO} & \theta^{OE}_{OU}-\theta^{OE}_{OO} & \theta^{OE}_{OO}-\theta^{OE}_{OO} \\
\theta^{OU}_{EE}-\theta^{OU}_{OO} & \theta^{OU}_{EU}-\theta^{OU}_{OO} & \theta^{OU}_{EO}-\theta^{OU}_{OO} & \theta^{OU}_{UE}-\theta^{OU}_{OO} & \theta^{OU}_{UU}-\theta^{OU}_{OO} & \theta^{OU}_{UO}-\theta^{OU}_{OO} & \theta^{OU}_{OE}-\theta^{OU}_{OO} & \theta^{OU}_{OU}-\theta^{OU}_{OO} & \theta^{OU}_{OO}-\theta^{OU}_{OO}
\end{bmatrix}_t}_{\Theta_t} \times \underbrace{\begin{bmatrix} EE \\ EU \\ EO \\ UE \\ UU \\ UO \\ OE \\ OU \\ OO \end{bmatrix}_{t-1}}_{n_{t-1}} + \underbrace{\begin{bmatrix} \theta^{EE}_{OO} \\ \theta^{EU}_{OO} \\ \theta^{EO}_{OO} \\ \theta^{UE}_{OO} \\ \theta^{UU}_{OO} \\ \theta^{UO}_{OO} \\ \theta^{OE}_{OO} \\ \theta^{OU}_{OO} \\ \theta^{OO}_{OO} \end{bmatrix}_t}_{a_t}$$

This discrete time Markov Chain has the equation of the form $n_t = \Theta_t n_{t-1} + a_t$ whereas the continuous time equivalent is $\dot{n}_t = \Lambda_t n_t + b_t$ where b_t is the continuous time equivalent of a_t. At the steady state we get $\bar{n}_t = (I - \Theta_t)^{-1} a_t$ for discrete Markov chain and $0 = \Lambda_t n_t + b_t \Rightarrow \bar{n}_t = -\Lambda_t^{-1} b_t$ for continuous Markov chain. Combining together, we get
$\bar{n}_t = (I - \Theta_t)^{-1} a_t = -\Lambda_t^{-1} b_t$.

Let $\Phi = n_t - \bar{n}_t$ be the deviation from the steady state. One can apply this transformation to the discrete Markov chain and get $n_t - \bar{n}_t = \Theta_t (n_{t-1} - \bar{n}_{t-1})$ (that is $\Phi_t = \Theta_t \Phi_{t-1}$) and to the continuous Markov chain and get $\dot{\Phi}_t = \Lambda_t \Phi_t$.

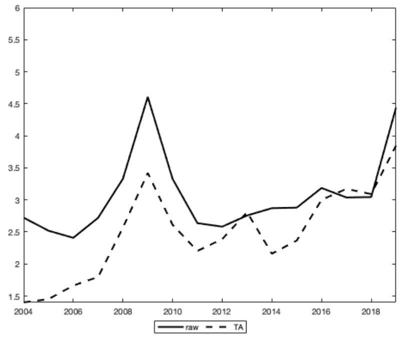
The continuous time differential equation has solution $\Phi_t = \Pi_t \Gamma_t \Pi_t^{-1} \Phi_{t-1}$ where Φ is the matrix of eigen vectors of Λ_t and Γ_t is the matrix whose diagonal elements are equal to the exponentiated eigen values of Λ_t. Since $\Theta_t = \Pi_t \Gamma_t \Pi_t^{-1}$ and we know that the eigen vectors of Λ_t are equal to those of Θ_t and the eigen values of Θ_t are equal to the exponents of the eigen values of Λ_t, we can infer the continuous

Markov transition matrix Λ_t by the above described eigen-value decomposition of the discrete Markov transition matrix Θ_t which we get directly from the data.

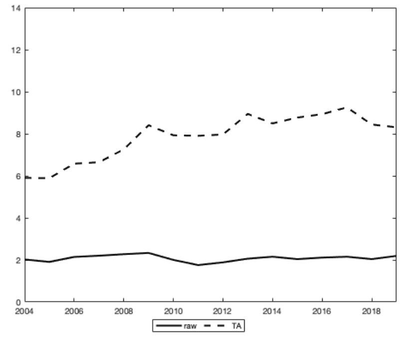
In figure A.2 and figure A.3, the raw flows of labor market states and the flows which are corrected for time aggregation bias are shown.

Figure A.2 Transitions of Married Men

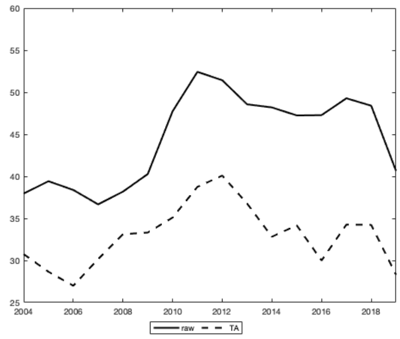
(a) E-U



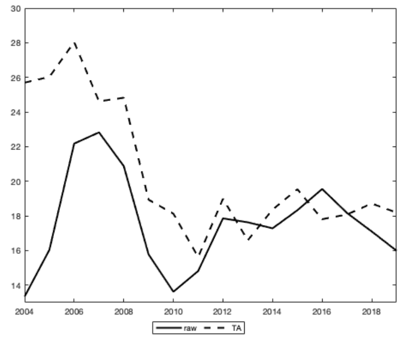
(b) E-O



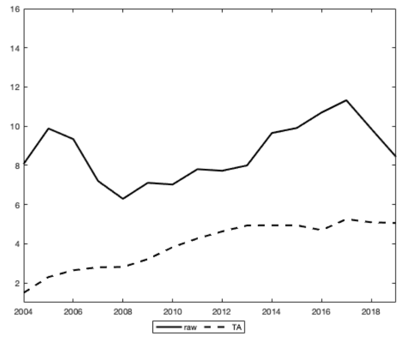
(c) U-E



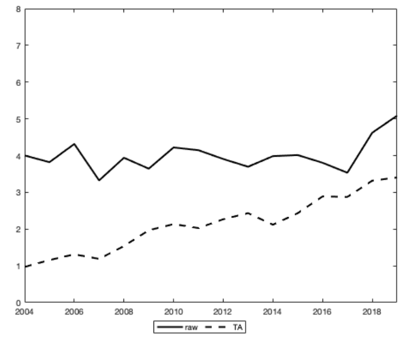
(d) U-O



(e) O-E



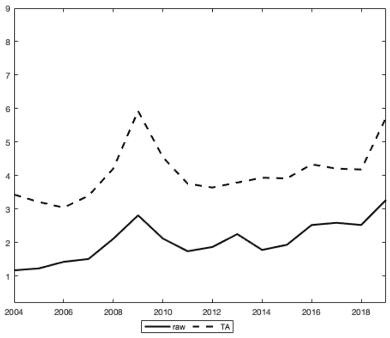
(f) O-U



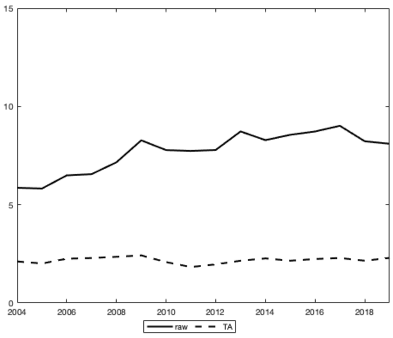
NOTE: HLFS 2004-2019. Married males aged 25-54. Solid lines show the raw flows. Dashed lines show the flows adjusted for time aggregation bias.

Figure A.3 Transitions of Married Women

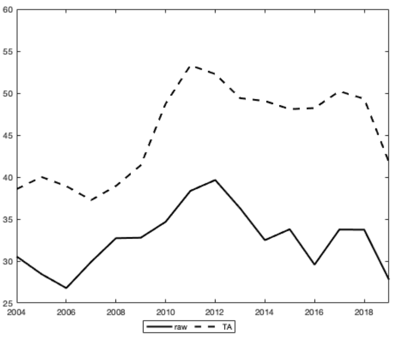
(a) E-U



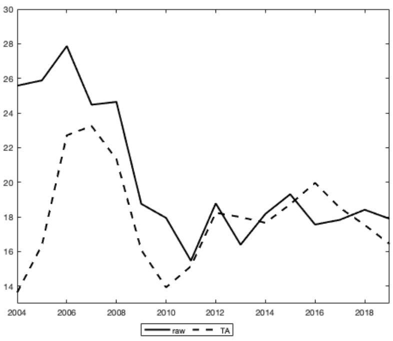
(b) E-O



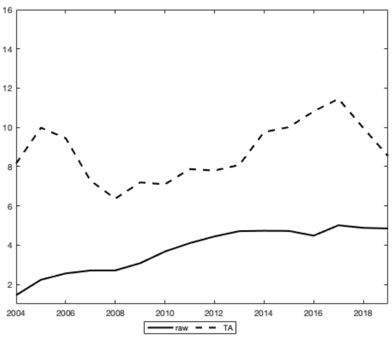
(c) U-E



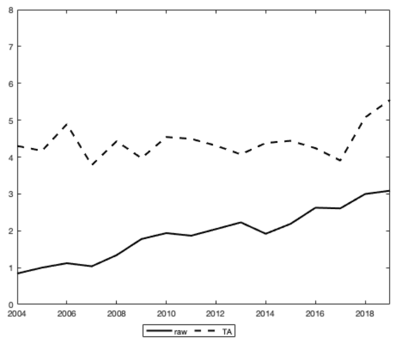
(d) U-O



(e) O-E



(f) O-U



NOTE: HLFS 2004-2019. Married females aged 25-54. Solid lines show the raw flows. Dashed lines show the flows adjusted for time aggregation bias.

A.3 Joint Labor Market Transitions

Table A.1 Average Joint Labor Market Transitions of Married Couples

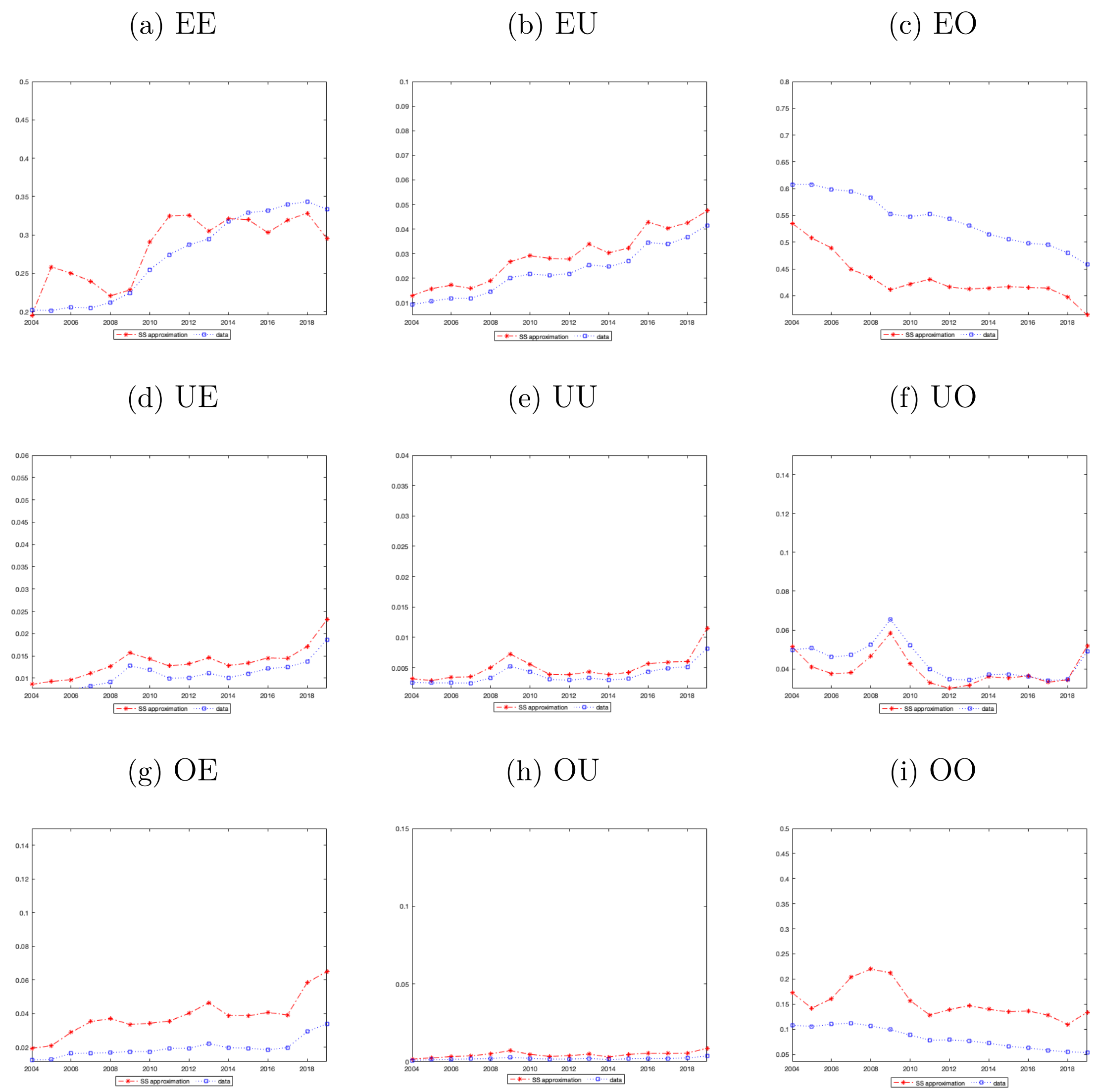
	EE	EU	EO	UE	UU	UO	OE	OU	OO
EE	87.08	1.91	6.91	2.01	0.21	0.35	1.10	0.03	0.37
EU	30.64	44.36	17.68	1.85	3.17	0.77	0.52	0.58	0.40
EO	3.74	2.00	87.36	0.16	0.14	4.09	0.07	0.02	2.38
UE	42.90	2.15	6.05	30.01	1.98	3.07	12.05	0.25	1.50
UU	20.48	14.82	6.83	9.33	27.48	7.35	2.13	1.77	9.77
UO	2.69	0.90	40.59	1.12	1.10	34.58	0.34	0.12	18.51
OE	8.34	0.35	1.10	3.62	0.24	0.39	74.57	4.06	7.28
OU	3.08	3.95	1.64	1.71	4.68	0.72	30.67	32.45	21.06
OO	0.81	0.13	7.56	0.14	0.27	3.88	1.85	0.67	84.65

NOTE: HLFS 2004-2019. All agents aged 25-54. The average of the transition probabilities of couples moving from states at each row to the states at each column. First(second) letter at each state corresponds to the state of the husband(wife). Letter E denotes employment, U denotes unemployment and O denotes out of the labor force.

APPENDIX B

B.1 Steady State Approximation

Figure B.1 Steady State Approximation and Data

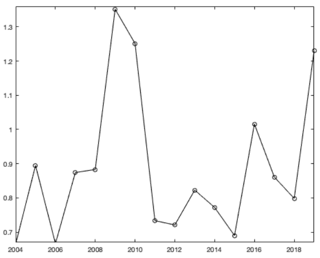


NOTE: HLFS 2004-2019. All agents aged 25-54. Dotted blue lines represent the data and dashed red lines represent the steady state approximations. First(second) letter at each state corresponds to the state of the husband(wife). Letter E denotes employment, U denotes unemployment and O denotes out of the labor force.

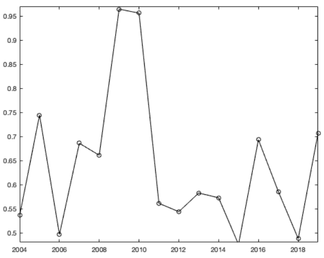
B.2 Added Worker Effect

Figure B.2 Added Worker Effect

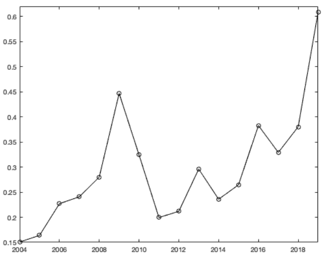
(a) Participation-all



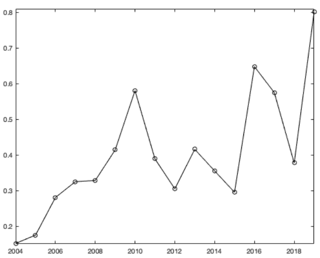
(b) Employment-all



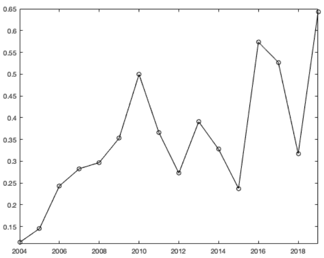
(c) Unemployment-all



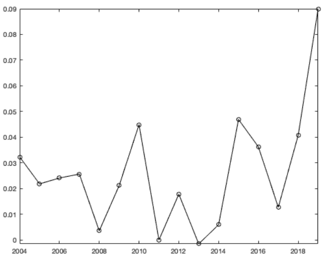
(d) Participation-male



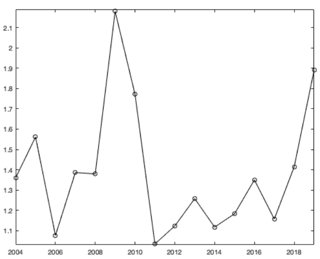
(e) Employment-male



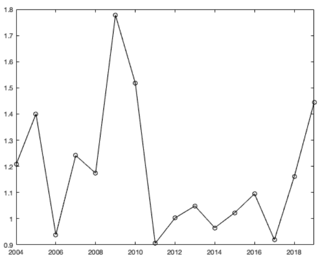
(f) Unemployment-male



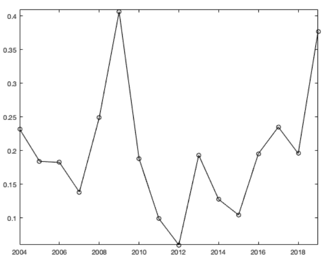
(g) Participation-female



(h) Employment-female



(i) Unemployment-female



NOTE: HLFS 2004-2019. All agents aged 25-54.