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Intensive margin and extensive margin adjustments of labor market: Turkey versus United States

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Abstract

In this paper, we document the intensive and extensive margin adjustments of labor market in Turkey and US. We find that both margins are important. More interestingly, the weight of intensive margin adjustment does not differ substantially between the two countries. Common wisdom and some theory would expect these countries to divert from each other significantly, because they represent two extreme points of labor market flexibility. A possible explanation for this result is the sizable informal sector and self employment in Turkey as it might reduce the large hiring and firing costs and encourage firms towards extensive margin adjustment.

The views expressed here are those of the author and do not reflect the views of the Central Bank of Turkey.

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1. Introduction

In this paper, we compare the intensive and extensive margin adjustment of labor market in Turkey and US. Our contribution is twofold. First we document the intensity of the two margins in Turkey for the first time. Second, we confirm the previous findings with updated data for the US.¹

Our empirical findings suggest that both intensive and extensive margin adjustments are significant. More interestingly, the two countries do not differ dramatically from each other although they represent very different labor markets. In particular, the two countries lie on the two opposite ends of OECD Employment Protection Legislation (EPL) index which is mostly taken as an indicator of labor market flexibility.² Therefore, one would expect the countries to divert from each other significantly in terms of labor market adjustment margins.³

Our paper is mostly related to Merkl and Wesselbaum (2011) in the literature. They compare Germany and US in terms of intensive and extensive margin adjustments and find that the weight of intensive margin is similar in these two economies. We provide complementary findings by comparing Turkey and US.

The intensive margin and extensive margin adjustment of labor has been a central question in several dimensions of economic research. Several papers analyze the role of intensive and extensive margins in business cycle fluctuations. For instance, Burda and Hunt (2011) compare intensive and extensive margin adjustments of US and Germany in the Great Recession and show that German labor market policies which make intensive margin adjustments less costly mitigated the labor market downturn in Germany during the Great Recession. Hansen (1985) documents the relative importance of intensive and extensive margins and studies the implications of a growth model with extensive margin labor adjustments. Kydland and Prescott (1989), and Cho and Cooley (1994) find that a real business cycle model containing both intensive and extensive margin adjustments in labor market represents US business cycles better than otherwise single margin models. Boysen-Hogrefe and Groll (2010) analyze the German labor market in the Great Recession, and find that wage moderation, flexibility of adjusting working time and short-time work (intensive margin adjustments) explain the outstanding performance of Germany during the Great Recession.

A number of papers including Saez (2002), Fang and Rogerson (2009), and Chang et al. (2012) study the effects of various tax-transfer systems in models where labor hours are allowed to be adjusted at both intensive and extensive margins.

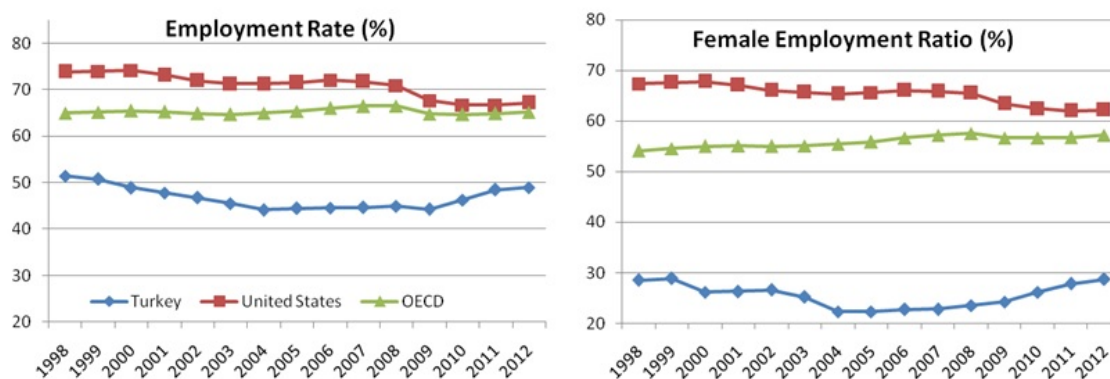
Congruous with our paper, some recent studies provide cross country comparison for

¹For instance Hansen (1985), Kydland and Prescott (1989), and Ohanian and Raffo (2012) document the relative weights of intensive and extensive margin adjustments in the US.

²See www.oecd.org/employment/protection for detailed description, and Venn (2009) for the latest update of this index.

³See Llosa et al. (2012) for a evidence on the correlation between EPL and extensive margin adjustment.

Figure 1: Labor Market Indicators



Source: OECD Employment Outlook 2013.

the importance of intensive margin adjustment in labor market. Blundell et al. (2011) decompose intensive and extensive margin labor adjustments for US, UK, and France over forty years up to 2008. They find that neither margin dominates in these three countries. However, the relative importance of the two margins differ by age, gender and family composition. Langot and Quintero-Rojas (2009) show that most of the difference between the total working hours of US and Europe is explained by extensive margin differences between the two economies.

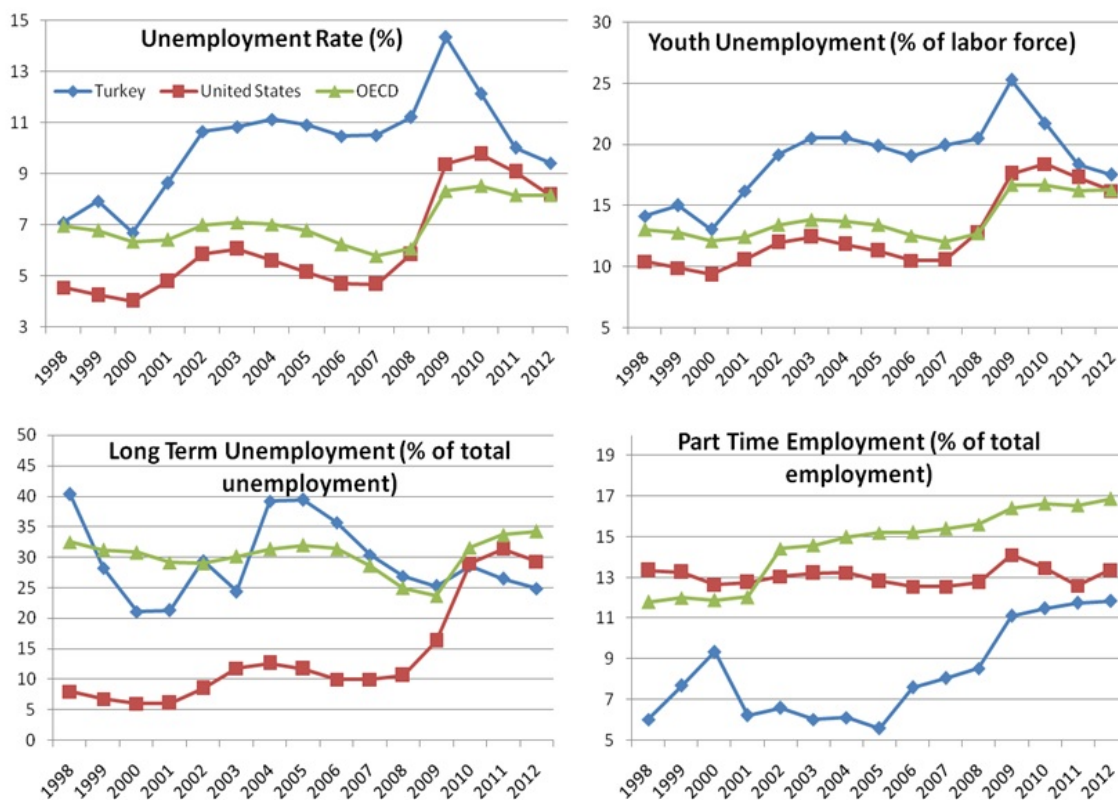
2. Some Labor Market Indicators: Turkey versus United States

In this section, we give some me fundamental indicators of the two countries.

As an emerging economy, Turkish labor market differs from that of United States in many respects. For instance, employment rate of Turkey is persistently and significantly lower than that of U.S. and OECD average. In Figure 1, the decline in employment rate of Turkey around 2001 reflects the financial crisis, whereas the soft decline in that of the U.S. reflects "dot com" crisis of the US. Turkey experienced a sharp and persistent decline in employment as a result of severe financial shock which deeply transmitted to the real sector, whereas U.S. faced a softer decline because they faced rather a sectoral shock. The decline in employment rate of US and OECD average reflects the impact of the Great Recession. Interestingly, Turkish employment rate declined slightly during this crisis, and recovered very quickly. As a result, the gap between the employment rate of Turkey and US started to shrink.

Turkish female employment rate is dramatically low in comparison with the international standards. Nevertheless, after the Great Recession, the gap in employment rates seem to be gradually closing. An interesting observation about the female employment figures is that employment rate of Turkish women rise and that of American women decline during crises episodes. (Figure 2) This can be, arguably, attributed to the fact that Turkish female employment rate is very low and there is significant room for added

Figure 2: Labor Market Indicators, cont'd



Source: OECD Employment Outlook 2013.

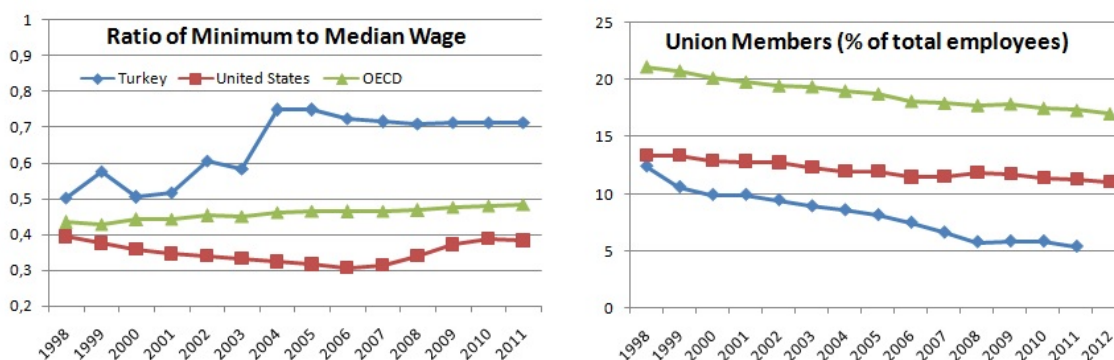
worker effect during crises.

In accordance with the story of employment rates, aggregate and youth unemployment rates reflect the impact of the two crises episodes. The two indicators increased in both countries in 2001 and 2009 crises. It was more severe for Turkey in 2001 and less for US. However, Turkish unemployment rates decreased very quickly following the 2009 crisis whereas jobless of US are still on the progress of recovery. Both aggregate and youth rates of unemployment seems to be converging in Turkey, US, and OECD. The rate of long-term unemployment in Turkey is even better compared to US and OECD average. In oppose to US and the OECD average, long-term unemployment rate of Turkey did not increase persistently, because the rate of aggregate and youth unemployment rebounded very quickly following the Great Recession. On the other hand, part-time employment, which provides a flexible margin for labor markets, is still lower than that of U.S. and OECD average. (Figure 2)

Figure 3 shows international trends in minimum wages, which is usually considered to be negatively correlated with employment.⁴ In order to make international comparisons, OECD uses the ratio of minimum to median wages as a normalized measure. Turkish

⁴See OECD(1998) for a literature review.

Figure 3: Labor Market Indicators, cont'd



Source: OECD Employment Outlook 2013.

minimum to median wage ratio is above that of the US and OECD average historically (Figure 3). In particular, the gap widens after 2003. On the other hand rate of unionization is smaller in Turkey in comparison with US and OECD average.

The OECD employment protection indices reflect the level of flexibility in labor markets. In general, stronger protection is associated with less flexibility in the markets. Figure 4 shows that employment protection in Turkey is persistently stronger than that in US and OECD average.

A comparison between Turkey and the US in terms of self employment and informal sector which provides flexibility in labor market is presented in Figure 4.⁵ Both self employment rate and the size of informal economy is substantially larger in Turkey compared to US and OECD average. Strong employment protection is arguably an important determinant on the size of informal economy. That happens due to the fact that employers hesitate to hire workers formally in order to avoid high costs of possible firings.

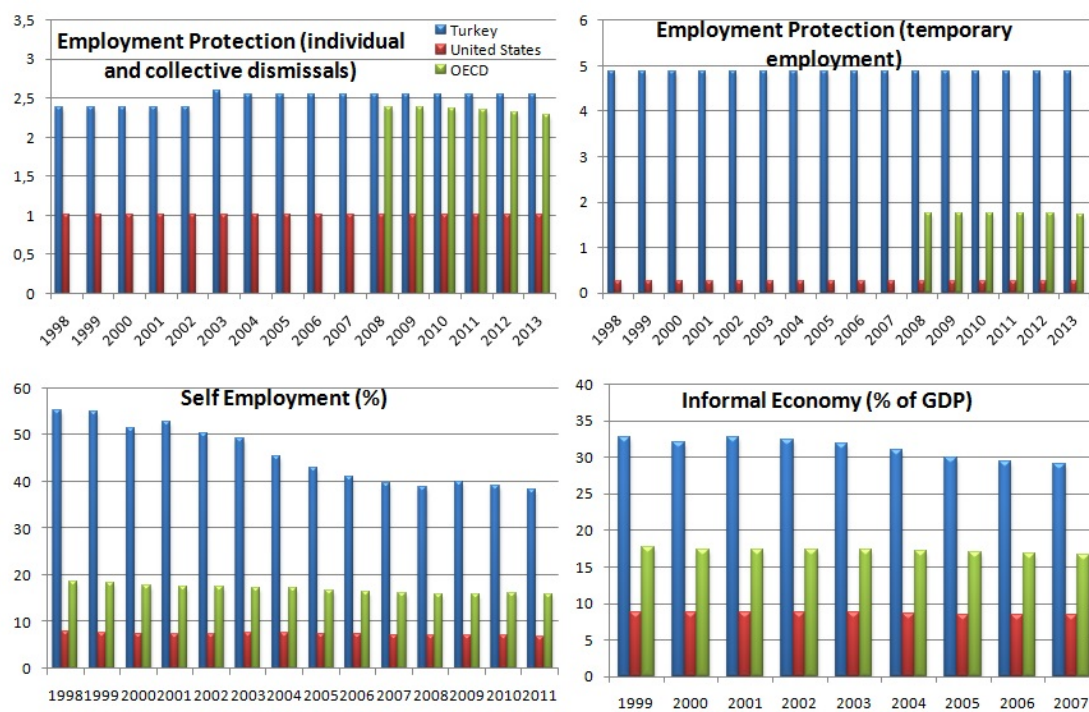
3. Data and Methodology

We use annual time series for total hours, employment, hours per worker, and real GDP of Turkey and US over the period of 1955 to 2012 which covers the entire available overlapping period for the two countries.⁶ The dataset, which is publicly available, is

⁵See Fiess et al. (2009) and Maloney (2004) for a discussion about informal sector and flexibility.

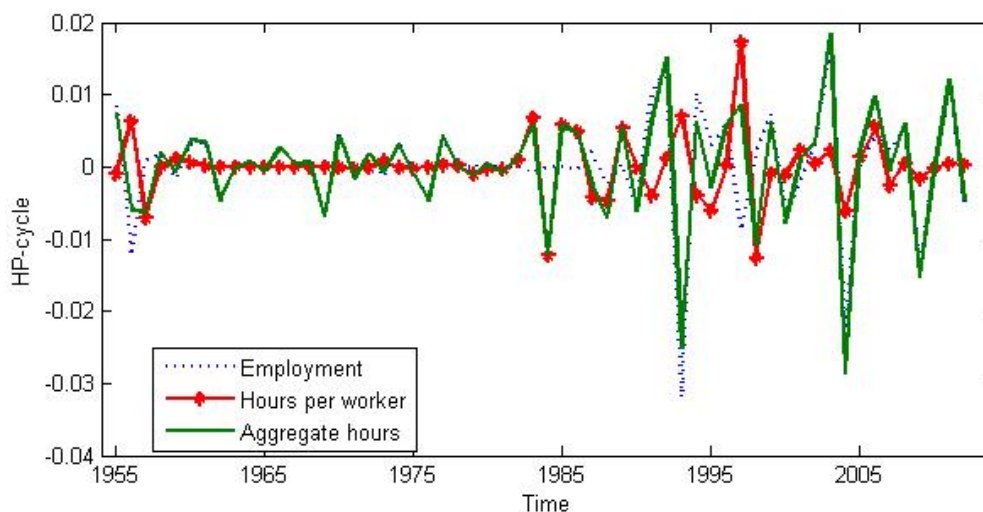
⁶Use of quarterly data would reflect the cyclical fluctuations better in comparison with annual data. However, Turkish hours per worker data are available only in manufacturing sector for a relatively short time period (1987Q1-2008Q1) at quarterly frequency. Therefore we used annual data for the benchmark case. As a robustness check, we repeated the empirical exercises with the quarterly data in manufacturing sector for Turkey and non-agricultural sector for the US. The results are reported in Table 3, and the fact that relative importance of intensive margin is similar in the two countries is robust to the use of quarterly data.

Figure 4: Labor Market Indicators, cont'd



Source: OECD Employment Outlook 2013, Shneider et al. (2007).

Figure 5: Intensive versus Extensive Margin: Turkey



Note: HP filter smoothing parameter (λ) is set to .40.

obtained from Conference Board.⁷

We use the Hodrick Prescott (HP, hereafter) filter, which is very common in the business cycle literature, to extract the cycles from the long-term trends of the series. We first take the natural logarithms of the raw series and then extract the cycles using the HP filter. The value of smoothing parameter is set to 6.25 for the US as there is a consensus on this number for developed countries. Rand and Tarp (2002) however suggest that the smoothing parameter for the emerging markets should be smaller due to the fact that their business cycles are more volatile in comparison with that of developed countries. Therefore we repeat the empirical exercise with a smaller value as well as 6.25 to filter the Turkish data. Note that the recent global crisis as well as country specific downturns are well captured by the filtering method. The HP cycles of the series for the two countries are presented in Figures 5 and 6.⁸

3.1 Decomposing Extensive and Intensive Margins

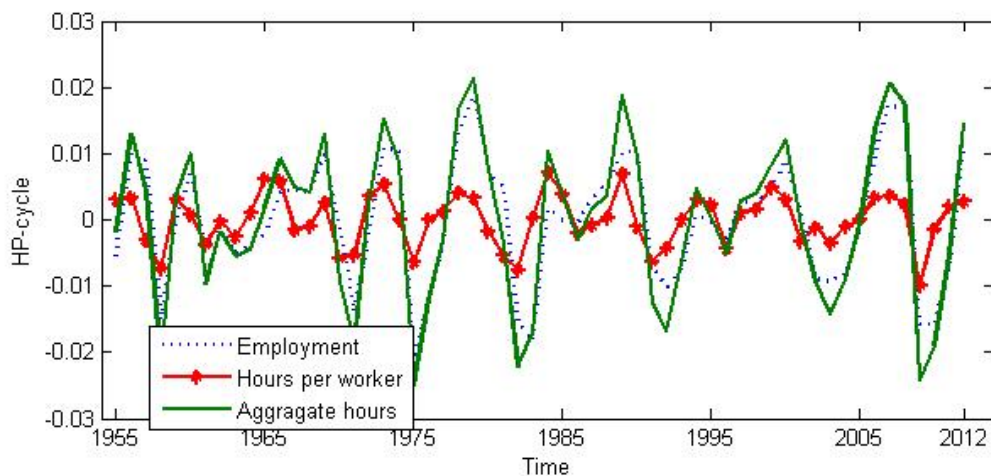
We use two common methods to calculate the contributions of intensive and extensive margin adjustments in response to the business cycles fluctuations.

First method follows Fujita and Ramey (2009), and Merkl and Wesselbaum (2011) who calculate the contributions as weights of the two adjustment mechanisms in the variation of total hours. More formally, total hours (T) can be written as the number of

⁷See <http://www.conference-board.org> for publicly available data.

⁸According to Figure 5, hours per worker is almost constant for Turkey between 1955 and 1983, which implies that employment explains all of the variation in total hours during this period. Because this is a very uncommon situation, we split the data from 1983 and repeated the empirical exercises for the period between 1983 and 2012. The empirical results do not change significantly (see Table 2).

Figure 6: Intensive versus Extensive Margin: United States



Note: HP filter smoothing parameter (λ) is set to 6.25.

workers (N) multiplied by the average hours per worker (H):

$$\begin{aligned}
 T &= N \times H \\
 t &= n + h \\
 \text{where } x &= \ln(X).
 \end{aligned}
 \tag{1}$$

Taking the variance of the two sides in equation (1) gives us the following equation:

$$\text{var}(t) = \text{var}(n) + \text{var}(h) + 2\text{cov}(n, h),
 \tag{2}$$

which can be rewritten as follows:

$$\text{var}(t) = \text{cov}(n, t) + \text{cov}(h, t)
 \tag{3}$$

The contribution of the two margins are expressed as the ratios of the correspondent covariance terms to the variance of total hours:

$$\eta^I = \frac{\text{cov}(h, t)}{\text{var}(t)}
 \tag{4}$$

$$\eta^E = \frac{\text{cov}(n, t)}{\text{var}(t)}
 \tag{5}$$

where, η^I and η^E stand for the contribution of intensive and extensive margin, respectively. Note that they sum up to 1.

Second method follows Hansen (1985), Burdett and Wright (1989), and Llosa et al. (2012), in which they divide the relative volatilities of the two margins to each other to calculate the contributions of the two margins. That is:

$$\nu^I = \sigma(h)/\sigma(y)
 \tag{6}$$

$$\nu^E = \sigma(e)/\sigma(y)
 \tag{7}$$

Table 1: Results, 1955-2012

	η^I	η^E	η^I/η^E	ν^I	ν^E	ν^I/ν^E
TR($\lambda = .4$)	.202	.799	.252	.336	.584	.576
TR($\lambda = 6.25$)	.214	.786	.273	.290	.519	.559
US($\lambda = 6.25$)	.253	.751	.337	.288	.691	.417
US($\lambda = 390.63$)	.235	.779	.302	.281	.616	.455

Note: See text for definition of η and ν . The alternative value for λ is set to .40 to filter annual Turkish data following Alp et al. (2012), Rand and Tarp (2002), and Ravn and Uhlig (2002). The alternative value for λ is set to 390.63 to filter annual US data following Shimer (2005), and Ravn and Uhlig (2002).

where, σ denotes standard deviation, and ν^I and ν^E represent relative importance of intensive margin and extensive margin, respectively.

4. Empirical Results

Table 1 presents the empirical results. The main result is that the importance of intensive margin is similar in the US and Turkey. According to the first method of decomposition, the weight of intensive margin adjustment is slightly greater for the US than that for Turkey (first two columns of Table 1). According to the second method, the result is opposite (last two columns of Table 1). However, the gap between the two countries is not dramatically different regardless of calculation method.

Since there is no consensus for the value of smoothing parameter (λ), we present the results for various values of this parameter within the commonly used values in the literature. The quantitative results are sensitive to the value of λ . However, the main result does not change, that is, the weight of intensive margin adjustment is similar in these countries.

Although the countries do not differ dramatically from each other, the second method returns greater numbers for both countries when we compare the relative weight of intensive margin in the two methods. The reason for this result is that the first method takes the comovement between total hours and the two margins into account, whereas the second method does not. As the comovement between employment and total hours is much stronger than that of the hours per worker, relative weight of intensive margin returns small numbers in the first method. On the other hand, the second method returns only the relative volatilities of the hours per worker and employment. Since their relative volatilities are closer to each other (compared to their comovements with total hours), the weight of intensive margin turns out greater numbers in the second method.

Our results contribute to the discussion of whether there is a correlation between labor market flexibility and importance of intensive margin labor adjustment to the

business cycle fluctuations. According to the EPL index, US is among the most flexible and Turkey is among the least flexible labor markets. Our empirical results suggest that two countries at the opposite ends of the EPL index do not differ from each other in terms of their labor market adjustment at the intensive and extensive margins. We interpret our empirical results as follows:

- Both intensive and extensive margin adjustments are significant in the two countries. Therefore, the business cycle models for these countries should incorporate both margins to reflect the labor market dynamics accurately.
- If EPL index is taken as a pure indicator of labor market flexibility, then we provide a counter example for the correlation between level of labor market flexibility and weight of intensive margin adjustment in labor market.
- Another way of interpretation is that some other observations as well as EPL may contribute to the accuracy of flexibility measures. In the case of Turkey for instance, although the legal hiring and firing costs are large, existence of informal sector and significant share of self employment might reduce the size of these costs on average. And, that might be reflected as a high extensive margin adjustment in the labor market.⁹

5. Conclusion

We study the intensive and extensive margin adjustments of labor market in Turkey and US, and show that the weight of intensive margin adjustment does not differ substantially in these two countries. Since Turkey and US are at the two opposite extremes of EPL index, one would expect significant difference between the labor market adjustment margins of these countries. A possible explanation for the fact that labor markets of these two countries respond similarly to the business cycle fluctuations is the sizable informal sector and self employment in Turkey as it might reduce the large hiring and firing costs for firms.

⁹Note that the implications of informal sector in terms of social welfare, productivity, and public policy are beyond the scope of this paper. Based on our empirical evidence, we only argue that incorporating the informal sector into the labor market flexibility indexes might improve the accuracy of the indexes.

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Table 2: Results, 1983-2012

	η^I	η^E	η^I/η^E	ν^I	ν^E	ν^I/ν^E
TR($\lambda = .4$)	.220	.780	.282	.358	.608	.588
TR($\lambda = 6.25$)	.219	.781	.280	.307	.526	.583
US($\lambda = 6.25$)	.258	.738	.350	.325	.753	.432
US($\lambda = 390.63$)	.212	.799	.266	.252	.645	.391

Note: See text for definition of η and ν . The alternative value for λ is set to .40 to filter annual Turkish data following Alp et al. (2012), Rand and Tarp (2002), and Ravn and Uhlig (2002). The alternative value for λ is set to 390.63 to filter annual US data following Shimer (2005), and Ravn and Uhlig (2002).

Table 3: Results, 1987Q1-2008Q1

	η^I	η^E	η^I/η^E	ν^I	ν^E	ν^I/ν^E
TR($\lambda = 100$)	.215	.773	.278	.405	.924	.439
TR($\lambda = 1600$)	.146	.848	.172	.364	1.113	.328
US($\lambda = 1600$)	.252	.748	.338	.408	.934	.437
US($\lambda = 100000$)	.248	.752	.329	.353	.928	.380

Note: See text for definition of η and ν . The alternative value for λ is set to 100 to filter quarterly Turkish data following Alp et al. (2012), and Rand and Tarp (2002). The alternative value for λ is set to 100000 to filter quarterly US data following Shimer (2005).