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The impact of workdays lost to strikes on wage growth in Turkey

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Abstract

This paper empirically examines how wage growth in Turkey has been influenced by workdays lost to strikes, by inflation and by real GDP through the vector autoregression model for the annual period 1963–2015. According to empirical results, wage growth is largely affected by workdays lost to strikes and inflation. This analysis is tested by considering workdays lost to industrial action in order to understand the main dynamics behind wage growth, because this is a significant factor in the elimination of macroeconomic imbalances in the Turkish economy. As a conclusion, the mathematical base social contract, new wage-setting, and inflation policies are recommended to reduce macroeconomic problems in Turkey.

Keywords: Mathematical base social contract, Vector autoregression (VAR), Input–output analysis, Industrial actions, Turkey

JEL Classification: C32, C67, E02, J30, J50

1 Introduction

The main questions in this paper are based on workdays lost to strikes, and on inflation and real GDP to understand their impact on wage growth, because this is one of the most important and direct influences on countries' economic policies. For instance, wage growth dynamically affects exchange rates, inflation and in particular a country's competitiveness in international trade. To understand the wage dynamics in Turkey, workdays lost to strikes must be taken into account because this gives trade unions the power to stand against low wage growth policy and to push for higher wage growth on the wage-bargaining table. In other words, the more workdays lost to strikes, the more government and industries incline to bow to the demands of trade unions. The first question is how workdays lost to strikes have impacted on wage growth in Turkey. The second question is how to develop new policies for preventing high wage growth that is not compensated by productivity growth. In essence, if the problem is solved, this can help reduce inflation and bring stability to the macroeconomic picture. The formula called the mathematical base social contract, a new wage-setting and inflation-controlling policy, can serve as the institutional solution for answering these questions.¹

¹ By collecting data between 1963 and 2015, we can run an econometric analysis for Turkey. This research is an example for prospective future research that might consider industrial actions.

The main motivation of this research is to prove how industrial actions can have a devastating influence on macroeconomic factors by implementing an empirical analysis. Although it is widely accepted that industrial actions are the principal reason behind high wage growth, there are only a few empirical studies on this, and there has not been an outstanding empirical work that took Turkey into account. There are several reasons why this has not been researched sufficiently. The first is about the transparency of statistics on industrial actions. The data of workdays lost to strikes are difficult to collect or access on a daily or monthly basis because wage bargaining usually happens once or twice a year, either with government or the employers' associations. Thus, collecting annual data to create a satisfactory model with enough time spans takes time. Second, the institutionalization of trade unions has remained behind economic development. For instance, in Turkey, although mechanization or industrial development began in the early 1950s, trade unions were only legalized in the early 1960s. In other words, after the technological change in the economy, Turkish peasants moved to industrial cities and became workers, something that had happened in the developed countries long before. After this economic phenomenon, trade unions were legalized by the government and could organize larger members. The difficulties pointed out above also made it hard to compare Turkey with a number of developing countries in terms of industrial actions because most countries have not made available enough data to facilitate a comparative analysis, or have lagged behind in the development process.² However, Turkey provides the chance to conduct such an analysis since it has regularly shared data on industrial actions since the early 1960s. The country has consistently released detailed statistics about industrial actions, enabling a time-series analysis. In consequence, it is possible to discuss the wage policy of the country in this research. Hence, this study aims to contribute to the economic literature for understanding the power of trade unions and its influence on wage growth, and to serve as a resource for the creation of new empirical analyses for other countries.

There is no direct research that can be used to estimate the effect of workdays lost to strikes on wage growth, but there is some indirect research. Card and Olson (1995) tried to show a systematic relation between the determinants of strike success and the determinants of the wage gain for successful strikes in the USA. This work indicates that successful strikes mostly created significant wage gains and failed strikes always resulted in no change in wages.³ Irfan (1982) explained changes in industrial employment, unionization and real wages for Pakistan. He estimated that the real wages of industrial workers were influenced by unionization, manufacturing output growth and minimum wage legislation. For the Turkish economy, Yüksel (1999) described the political, social and economical results of strikes. His work points out that manufacturing industries are where workers are most willing to organize strikes. Alesina and Giavazzi (2006) discussed how the lobbying power of trade unions on governments directly influences economic policy in many European countries, and how this lobbying factor blocks reforms which might

² For instance, most of the developing countries or former communist countries did not release enough data for the conducting of a comparative analysis.

³ This empirical analysis covers the years between 1881 and 1886.

otherwise create a system called flexicurity, which provides flexible and secure conditions for the workers. In some previous research, Turkey was analyzed in terms of its integration into the EMU and its relationship with China (Ünal 2016a, b, 2017).⁴ These papers demonstrated that the most important cause of low competitiveness in Turkey was its very high wage growth, which was not compensated by productivity growth. Therefore, in this paper, it is important to highlight what factors caused high wage growth by calculating productivity growth rates via input–output tables, and connecting the assumptions to the empirical analysis. This paper provides a concrete analysis of the role trade unions' power plays, and how conflict in wage negotiations can be eliminated via the mathematical base social contract, new wage-setting and inflation policy.

In Sect. 2, the methodology of the research and connection between wage growth, inflation and exchange rates are discussed in order to explain the importance of wage growth. For this, input–output analysis is used to estimate productivity growth and unit labor cost (ULC), and their impact on inflation and purchasing power parity (PPP). In Sect. 3, trade unions and wage–labor relations are discussed from a historical perspective. In Sect. 4, the dynamic effects of workdays lost to strikes, inflation and real GDP on wage growth are examined by forecast error variance decomposition and impulse response function in the framework VAR model (Sims 1980). In Sect. 5, results are discussed and institutional changes are recommended.

2 Methodology and connection between wage growth, inflation and exchange rates

High labor cost growth in the economy can cause high inflation and an unstable exchange rate. This relationship can be explained using two important assumptions. First, if a country's wage growth is greater than its productivity growth of export goods, this can cause high unit labor cost growth in export goods and possible depreciations in the exchange rate if the trading country has lower unit labor cost growth in export goods. Second, if wage growth is greater than the productivity growth of non-tradable goods, this can cause high inflation in the economy (Ünal 2016a, b, 2017).⁵ Therefore, wage growth is the essential factor that influences inflation and the exchange rate. ULC can be calculated as follows:

$$ULC = wv = w/q \quad (1)$$

w is nominal wage rate, q shows productivity calculated through inverse of vertically integrated labor input coefficients (v). Thus, ULC growth, wage rate growth and productivity growth can be indicated with circumflex (\wedge) as follows:

$$ULC = \hat{w} - \hat{q} \quad (2)$$

The prices of export goods (p_e) and non-tradable goods (p_n) are indicated as follows:

$$p_n = (1 + m_n)(wv_n + c_{im}) = (1 + m_n)(w/q_n + c_{im}) \quad (3)$$

⁴ Ünal (2016b) compared the Turkish economy with the Chinese economy. According to this research, Turkey should link its wage growth to the productivity growth of non-tradable goods.

⁵ For additional information, see Ünal (2007, 2012), who explained the exchange rate system for East Asian countries.

In Eq. (3), subscript n indicates non-tradable goods. In the condition of negligible import cost (c_{im}) and proportional wage rate growth and mark-up rate ($1+m$), the equation is thus described:

$$\hat{p}_n = (\widehat{1+m_n}) + \hat{w} - \hat{q}_n \quad (4)$$

This equation basically gives the inflation rate in a country and shows its connection with wage growth.

$$p_e = (1+m_e)(wv_e + c_{im}) = (1+m_e)(w/q_e + c_{im}) \quad (5)$$

Equation (5) is the price level of export goods. Subscript e indicates export goods. By considering this price model, it is possible to get hypothetical exchange rate, called PPP, between countries A and B as follows⁶:

$$PPP^A(p_e^A) = (p_e^B) \quad (6)$$

This equation can be written:

$$PPP^A = (p_e^B)/(p_e^A) \quad (7)$$

In other words, more details can be added to the equation by including the mark-up rate and removing import costs, which are negligible, in both countries;

$$PPP^A = [(\widehat{1+m_e^B}) + \hat{w}^B - \hat{q}_e^B] - [(\widehat{1+m_e^A}) + \hat{w}^A - \hat{q}_e^A] \quad (8)$$

The methodology and assumptions described above give information about how wage growth affects inflation and the hypothetical exchange rate, PPP. The higher wage growth is, compared with the productivity growth of non-tradable goods and export goods, the greater inflation will be and the more the exchange rate might depreciate. Figure 1 clearly shows this effect. According to Fig. 1, greater wage growth compared with productivity growth rates in these periods brought enormous inflation rates and large depreciations in the lira. High ULC growth stimulated by industrial actions and unfavorable wage-setting policies were significant factors in this. Therefore, it is useful to understand though the VAR model why Turkey has experienced high wage growth. As seen in Fig. 1, Turkey could not decrease its wage growth to match its productivity growth rates and it consistently experienced high inflation and an unstable exchange rate between 1973 and 2011 (see Table 1).

As shown in Fig. 1 and Table 1, wage growth, inflation and exchange rates show correlated movement over time. Wage growth generally remained greater than inflation over the periods under consideration. The mean wage growth was 39.4% and that of inflation was 38.5%. This means that the wage growth was basically considered in bargaining to be set greater than inflation. Moreover, decreasing wage growth also

⁶ Country B represents a perfect economy, where productivity growth of export goods and non-tradable goods, and proportional wage growth are equal to each other ($\hat{w} = \hat{q}_n = \hat{q}_e$).

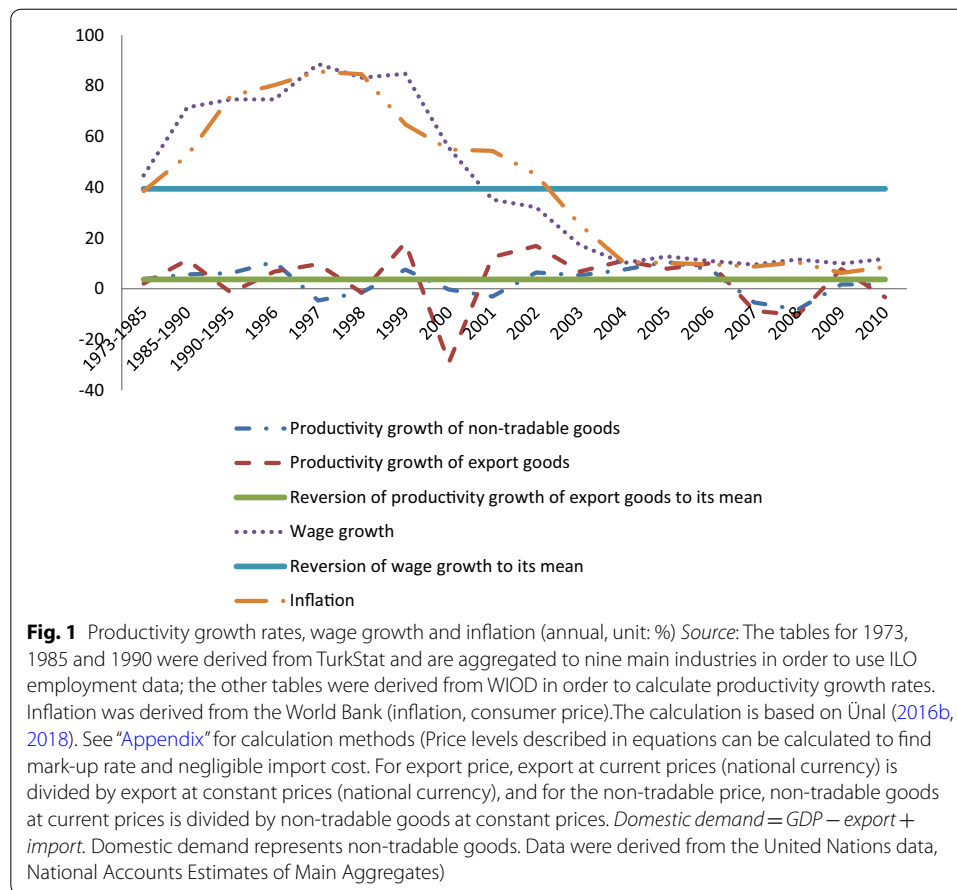


Table 1 ULC growth rates, PPP and nominal exchange rate (annual, unit: %) *Source:* The change rate in the lira against the US dollar was derived from the Central Bank of the Republic of Turkey. For additional information, see Fig. 1

Factors	1973–1985	1985–2003	2003–2011
Change rate in the lira against the dollar	– 49.5	– 59.3	– 1.8
Change rate in PPP against the United States	– 30.9	– 64.3	– 7.2
ULC growth in non-tradable goods	30.4	63.2	8.2
ULC growth in export goods	32.2	60.9	7.2

Wage rate growth was proportional in both non-tradable goods and export goods, and imported material cost was negligible, but there is no constant mark-up rate to calculate PPP

PPP is the hypothetical exchange rate. In a country, if the appreciation of PPP is higher than that of the nominal exchange rate, it means the country's exchange rate is undervalued

shows parallel movement with inflation and slowing depreciations in the lira. This fundamentally indicates that wage policy is an effective tool which must be taken into account as a dynamic factor behind inflation and exchange rates. In addition, the most significant information on the table is where wage growth remained above productivity growth, which shows that the economy is driven by the high cost of production and wage growth, which are not flexible. The mean productivity growth of export goods was approximately 3.7% and that of the productivity growth of non-tradable

goods was approximately 2.8%. In particular, in a free market, whereas the reversion of the productivity growth of export goods to its mean happens consistently, the same reversion movement is not indicated in wage growth. This shows that wage growth is not dependent on natural market conditions, but is artificially set by policy makers. In other words, wage growth is not flexible and does not fluctuate according to economic conditions.

3 Trade unions and wage–labor relations in Turkey

Trade unions were institutionalized in the early 1960s in Turkey. For the first time, workers had the right to negotiate collective agreements with the government and employers' associations, to utilize the collective bargaining process and to engage in industrial strikes organized by their trade unions. This right has its roots in the pre-1960s, when labor power was not unionized and the Turkish economy was largely based on agricultural growth. Agricultural workers were the engine of production. At that time, without unionization and industrial development, a large agricultural sector did not organize effective actions to increase their wages. However, industrialization attracted workers from rural areas to factories and created a working class, distinctive from farm workers. Moreover, it became easier to organize workers who were intensively populated in cities. Thus, the institutionalization of workers became an important factor in the creation of decent working conditions in the production process. Implementing import substitution industrialization during the 1960s under planned economic policies developed the rights of workers. In this period, Turkey followed protectionist policies, but the militancy of communism in the unions and ideological strikes distorted economic and political life. As protectionism came to dominate the economy, it became essential to develop domestic industries. Workers were not only key to the production process but were also an important part of domestic consumption. Hence, it was a strategic condition for the government that workers be considered a factor in consumption growth, and this became the most significant reason behind welfare policies. To widen the wealth of workers, trade unions gained the legal status to organize industrial actions. In addition, to develop the domestic market and national industries, the government legislated to regulate industrial production to encourage for domestic demand. The increasing power of workers began to influence wage growth, inflation and the value of the lira. The trade unions effectively organized industrial actions by harnessing communist populism in the 1960s and 1970s.

In the 1980s, Turkey abandoned domestic consumption growth and transformed its economy to promote export growth. The military coup in the early 1980s halted industrial actions and banned trade unions for around 3 years. Nevertheless, the democratic parties eventually re-emerged and achieved government, and then, the trade unions were liberated. Hence, industrial actions significantly increased over the next few years and workdays lost to strikes peaked. During this period, Turkey tried to implement deregulation policies, which had been slowed down for political reasons, due to social upheavals.⁷ Furthermore, Turkey experienced record levels of inflation and depreciations in the

⁷ Social upheavals refer to industrial action when trade unions intensified their actions against deregulation policies (see Fig. 2).

exchange rate (see Fig. 1). In the 1990s, trade unions were accused by the government of being the cause of Turkey's main economic problems. Over the years, society was gradually disrupted by continual industrial actions. The government lost its ability to function as an effective tool for institutional changes. Against all unfavorable policies, the most important thing that the government could do was to establish the Privatization Board of Turkey. This gave the government a chance to reduce the influence of trade unions in the economy, which helped in the privatization of industries so that the link between trade unions and industries could be diminished. Nevertheless, this did not prevent Turkey experiencing the worst economic crisis in its history. After the economic crisis in 2000–2001, Turkey implemented a number of institutional changes in wage–labor relations and the exchange rate system. The changes were supported by deregulation policies. Privatization transactions increased significantly, and foreign direct investment (FDI) inflows intensified in the chemical and chemical products, electric and optical equipment, machinery, and transport equipment industries in the 2000s.⁸ Although inflation targeting was implemented, it was never able to achieve a satisfactory level of inflation. The outstanding performance of the Turkish economy slowed down in the 2010s, as in previous periods. Turkey experienced a dramatic depreciation in its exchange rate. Between 2010 and 2016, depreciation in the exchange rate was on average 10.3%. Inflation and interest rates remained high. In 2016, inflation was 7.7% and the interest rate was 14.6%.⁹ Although deregulation policies weakened labor power and reduced industrial actions in the country, the unions have still maintained their power to increase wages. Nevertheless, high inflation remains a problem in the economy, and the lira still has been experiencing ongoing depreciations.

4 Influence of workdays lost to strikes on wage growth

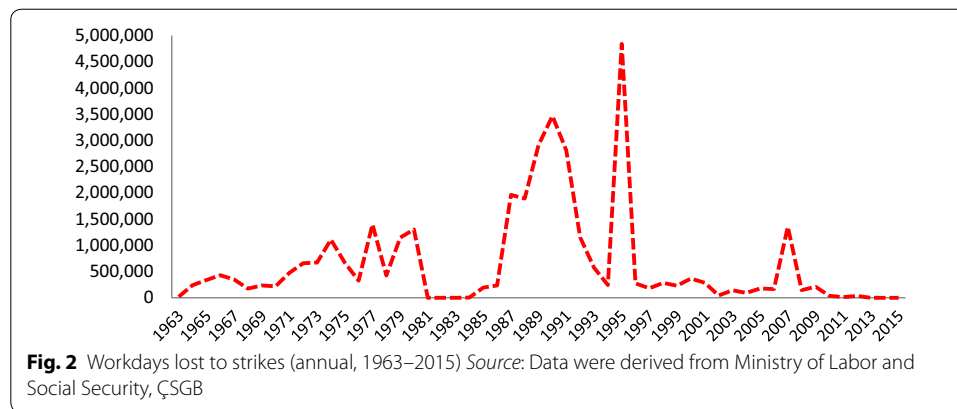
In Turkey, there are several factors that influence wage growth, which are being discussed for wage bargaining among the trade unions, employers' associations and the government. The first thing trade unions always demand from the government and the employers' associations is a wage increase above the inflation rate. Thus, wage increases and the inflation rate have been moving in parallel. The most developed countries changed their policies in the 1980s, to increase wage growth in accordance with productivity growth rates.¹⁰ In practice, the developed countries basically aimed to consider wage increases in terms of GDP growth in order to eliminate inflation, and to follow an intensive export growth policy.¹¹ In contrast to the developed countries, Turkey is still implementing the same wage policy based on the inflation rate. However, the power of trade unions cannot be ignored, as it continues to influence wage policy. In particular, workdays lost to strikes is considered to be the most important factor in this paper, because the main aims of industries are to keep producing. In a dispute about wage increases, the first thing that is decided by trade unions is to organize strikes, and this

⁸ For additional information, see Ünal (2017).

⁹ Source: For exchange rate, data were derived from the Federal Reserve Bank of St. Petersburg. Louis (national currency to the US dollar exchange rate), the inflation rate was derived from the World Bank (inflation, consumer price) and deposit interest rate was derived from the IMF.

¹⁰ For additional information, see Ünal (2018).

¹¹ There are some cases in European Union countries that aim to consider wage growth according to European Central Bank's inflation targeting close to 2%.



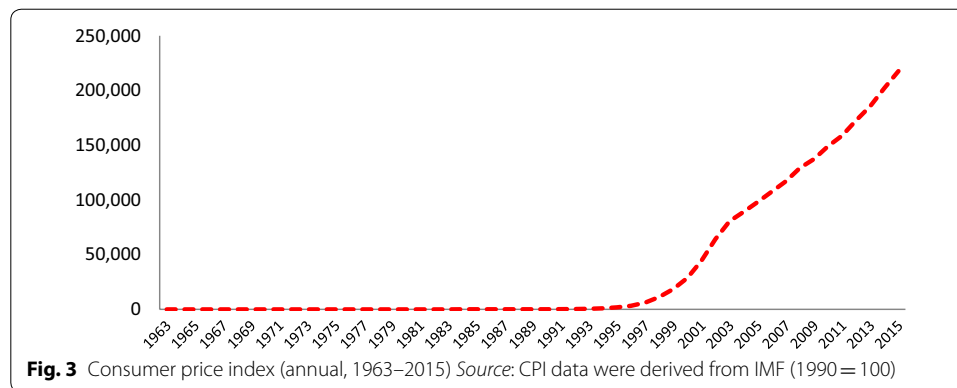
causes workdays to be lost and entails costs for the employers. Hence, three factors that are assumed to influence wage growth are detailed in this paper. These are workdays lost to strikes, inflation and real GDP. The annual data of workdays lost to strikes until the year 1963, when the trade unions became institutionalized, were collected, and their connection to inflation and real GDP and to wage growth was estimated by empirical analysis.

4.1 Data collection

High wage rate growth has been the basic cause of high inflation rate and unstable exchange rates. Therefore, to find the influences of industrial actions, inflation and real GDP growth on wage growth, the data for workdays lost to strikes and for other two variables were collected annually between 1963 and 2015.¹² Inflation has been a main factor in creating wage growth. This means that when a country experiences low productivity growth in non-tradable goods and high wage growth, trade unions can demand greater wage growth in a year as a compensation for inflation. However, this can also serve to increase inflation because the productivity growth of non-tradable goods does not increase at the same pace. This problem is caused by industrial actions dictated by the power of trade unions. Real GDP could have been taken as general wage-setting factor, but this policy was not explicitly considered in Turkey.

Figure 2 shows the annual workdays lost to strikes in Turkey. The important point that must be noted is that the country experienced rising workdays lost to strikes in the 1960s. Workdays lost to strikes rose significantly in the 1970s because radical politics gained popularity and extended to all social classes. Trade unions played an important role in this due to their influence on workers and radical social movements. Militancy extended across the country. As seen in Fig. 2, the military coup in the early 1980s cut wage strikes considerably, which lowered workdays lost to strikes. However, as also seen in Fig. 2, workdays lost to strikes reached high levels at the end of the 1980s and in the early 1990s. The industrial actions that caused the most significant increase in workdays lost happened in the mid-1990s. Workdays lost to strikes rose to approximately 19.7

¹² Ministry of Labor and Social Security. Grev ve Lokavt uygulamaları, in Turkish, (<http://www.csgb.gov.tr/home/contents/istatistikler/grevlokavtuygulamalari/>) accessed on February 14, 2017.

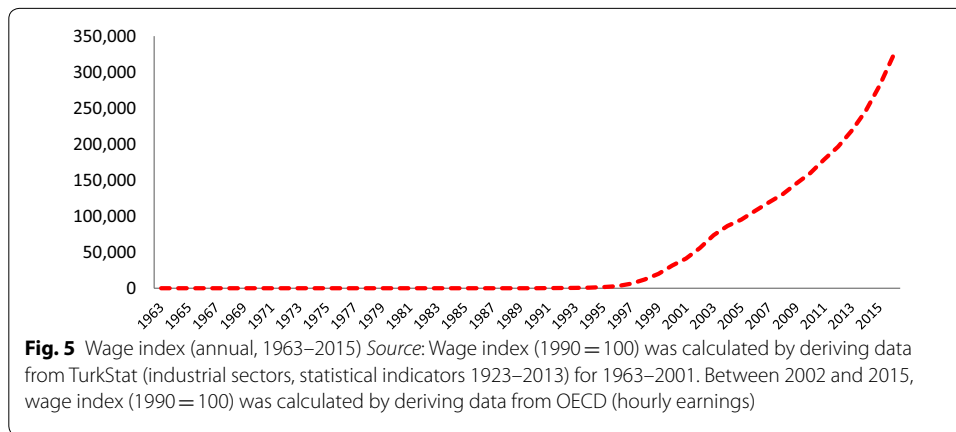
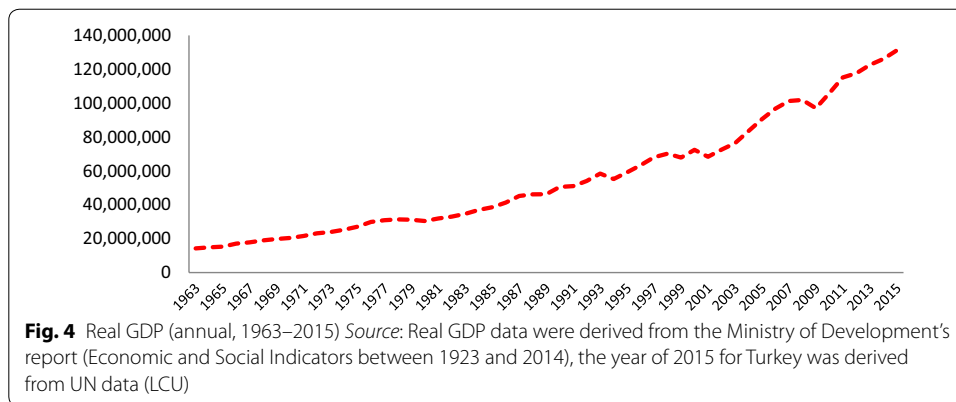


thousand days in 1963. As trade unions gained power, workdays lost to strikes rose to 1.1 million days in 1974 and 1.4 million days in 1978. In 1980, before the military coup, workdays lost to strikes were 1.3 million days. After the coup, when the trade unions were banned, lost days fell to zero in 1981, 1982 and 1983. In 1984, they were limited to 4.9 thousand days, but they dramatically increased over time and workdays lost to strikes in 1990 were 3.5 million days. Historically the record level for workdays lost peaked at 4.8 million days in 1995. Despite decreasing workdays lost to strikes in subsequent years, the Turkish economy experienced 1.3 million workdays lost in 2007. In 2012, workdays lost amounted to 36 thousand days, but in 2015 fell to just 129 days. Even in the 2000s, some strikes, as seen in Fig. 2, when compared with previous periods, were much more reduced.

Figure 3 shows the consumer price index (CPI) in Turkey. The figure indicates that the variable is subject to trends. Turkey's CPI has consistently increased since 1963. However, there is a large difference between inflation before and after the institutionalized industrial actions of the trade unions. In 1960, inflation was 1.3%. When the industrial actions began in 1963, inflation was just 3.1%. This number was acceptable for a developing country. However, over the years, inflation and other macroeconomic imbalances deepened in the Turkish economy. During the 1970s, inflation passed 10% and in 1974 was 15.8%.

At the end of the 1970s, as industrial actions increased, inflation stood at 45.3% in 1978, 58.7% in 1979 and a record level of 110.2% in 1980. After the military coup in 1980, the inflation rate decreased significantly, to 30.8% in 1982. Nevertheless, after the re-establishment of democracy, inflation gradually increased and again hit high levels. When workdays lost to strikes increased again at the end of the 1980s, inflation hit approximately 73.7% in 1988. Until the mid-1990s, inflation was consistently over 60%. And in 1994, the inflation rate peaked at 106.2%. Following this peak, inflation gradually started decreasing. Nevertheless, compared with most of the developed countries, inflation has remained very high in Turkey in the 2000s and 2010s. In addition, inflation has remained above productivity growth rates and far above its level in the early 1960s.

Figure 4 shows real GDP in the local currency unit between 1963 and 2015. Turkey experienced a consistent increase in its real GDP. Turkish GDP growth was approximately 4.4% between 1963 and 2015. The GDP growth moved in correlation with inflation and workdays lost to strikes. Toward the end of the 1970s, real GDP growth was



very low. It was 1.5% in 1977, -0.6% in 1978 and -2.4% in 1979. Although the GDP increased to around 5.4% between 1980 and 1987, it showed a dramatic decrease to 0.2% in 1988 and 0.9% in 1990. These years witnessed a high level of workdays lost to strikes. Between 1993 and 1994, Turkey experienced negative GDP growth of approximately -5.4% . In the 2000–2001 economic crisis, Turkey experienced its lowest GDP growth at -5.7 and -4.8% in 2008, in correlation with the global economic crisis.

During the 1970s, the key component of the growth was non-tradable goods (see Fig. 1). The productivity growth of non-tradable goods was higher than that of export goods. However, during the 1980s, Turkey shifted to export growth policies. Thus, export growth became the most important component of economic growth.

Figure 5 shows the wage index in Turkey. The variable indicates the nature of the trend. Wage growth was on average 19.1% between 1950 and 1970. During the 1970s, Turkey experienced a large increase in its wage growth. In the period 1970–1980, wage growth was 43.1%. Although wage growth decreased after the 1980s, when the global trend in developed countries shifted to fostering export growth and limiting the power of the trade unions, wage growth sharply increased to 66.3% in the period 1980–2000. In the figures shown, the variables display parallel macroeconomic factors in their time span. Nevertheless, ultimately, the country experienced high wage growth, not compensated

Table 2 Results of ADF unit root test *Source: Data were derived from Ministry of Labor and Social Security, ÇSGB. In Turkish, Grev ve Lokavt uygulamaları, see the link (<http://www.cs.gb.gov.tr/cs.gbPortal/cs.gb.portal?page=grevlokavt>) accessed on January 20, 2016*

Tests	<i>wdls</i>	<i>cpi</i>	<i>gdp</i>	<i>wi</i>
Level				
<i>t</i> -Statistic	−2.5430	−1.3446	−0.9620	−1.3676
<i>p</i> Value	0.1115	0.6020	0.7601	0.5908
First difference				
<i>t</i> -Statistic	−6.9755	−1.8153	−7.3857	−1.4824
<i>p</i> Value	0.0000	0.3692	0.0000	0.5344
Second difference				
<i>t</i> -Statistic	—	−7.9961	—	−6.6064
<i>p</i> Value	—	0.0000	—	0.0000

Mackinnon (1996) one-sided *p* values are considered. Maximum lag length is 10, the optimum lag is selected by Schwarz Info Criterion

by the productivity growth of export goods. Furthermore, wage growth became flat at around 10% in the 2000s, but in the 2010s, it showed a slight increase to 14.4%.

In this paper, the first factor included for analysis is “workdays lost to strikes” in Turkey. The second factor determining wage increases is inflation; in other words, CPI, because trade unions characteristically take inflation into account when pushing for higher wages, in order to maintain or improve the living standards of their workers. In this way, trade unions strive to protect or enhance the purchasing power of workers. This is used to legitimize a wage increase above the inflation rate. The final factor is the real GDP growth of the country. It is assumed in this paper that high real GDP growth gives trade unions the opportunity to demand much higher wage increases. All data are described in logarithmic form. As the workdays lost to strikes were zero in 1981, 1982, and 1983 after the military coup, to get the logarithmic form of the variable, +1 was included for each year. The variables are described as follows:

wdls: workdays lost to strikes

cpi: consumer price index (1990 = 100)

gdp: gross domestic product (real, LCU)

wi: wage index (1990 = 100).

4.2 Unit root test

Augmented Dickey–Fuller (ADF) unit root,¹³ which has been popular in general econometric analysis, was used for determining the integrated order of variables. The ADF equation included only intercept term for the deterministic component. As seen in Table 2, all variables were not stationary at a 5% level of significance.

In the first difference of the variables, *wdls* and *gdp* became stationary, and in the second difference of the variables, *cpi* and *wi* became stationary. The results in Table 2 indicate that all variables are not stationary at the same differences. In other words, integrated orders are one for *wdls* and *gdp*, whereas they are two for *cpi* and *wi*. Therefore, in the vector autoregression (VAR) model, while for *wdls* and *gdp* logarithmic level is used,

¹³ For additional information, see Dickey and Fuller (1981).

Table 3 Results of forecast error variance decomposition for wage index

Period	<i>wdls</i>	<i>dcpi</i>	<i>gdp</i>	<i>dwi</i>
1	16.7600	8.6597	4.0154	70.5647
2	24.3467	15.5631	3.0623	57.0277
3	28.3450	18.8374	2.5543	50.2630
4	30.7384	20.4902	2.2409	46.5303
5	32.3344	21.4094	2.0217	44.2344
6	33.4783	21.9675	1.8556	42.6984

The optimal lag order is selected as 1 out of 4 according to Schwarz Criteria. *d* stands for first difference

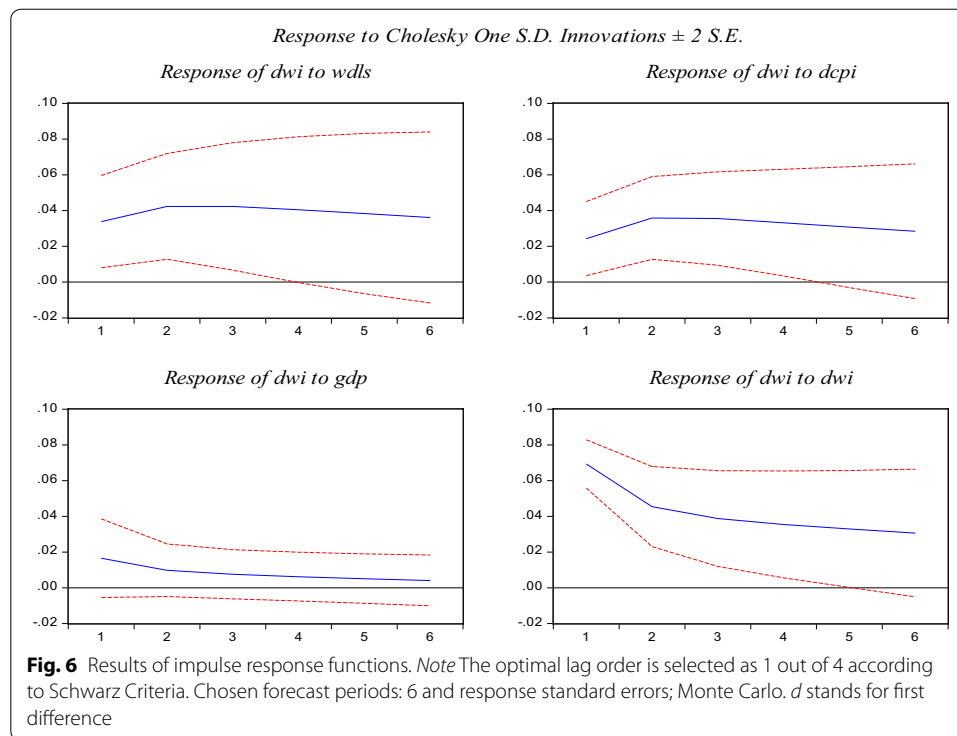
for *cpi* and *wi* logarithmic first difference is used. Thus, the variables that are in the VAR model are not stationary, but their integrated orders are equal to one.

4.3 Forecast error variance decomposition

According to the assumptions in this paper, wage growth is instantaneously influenced by workdays lost to strikes. Furthermore, such industrial action also plays a significant role in inflation, as it widens the gap between wage growth and the productivity growth of non-tradable goods. That results in high inflation. From this perspective, it is assumed in this paper that real GDP is instantaneously influenced by those of the other two factors. Hence, Cholesky ordering is *wdls*, *cpi*, *gdp*, *wi*, respectively, for the VAR model.

Table 3 shows the result of forecast error variance decomposition to explain the proportion of the changes in wage index due to its own shocks, and against shocks to the other variables in six periods. For Turkey, according to the table, in the first period, effects of around 16.7, 8.6 and 4%, of the workdays lost to strikes, inflation and real GDP, respectively, accounted for the level of wage growth. Furthermore, wage growth was affected by itself at around 70.5%. In the second period, both workdays lost to strikes and inflation's contributions increased significantly, and in the following periods, the two variables showed slower changes. Moreover, in the same period, wage growth's own effect decreased dramatically. In the sixth period, the contribution of variables for explaining wage growth changed considerably. The proportion of workdays lost to strikes increased significantly to 33.5%, and that of inflation rose to 21.9%, but that of real GDP and wage growth decreased to 1.8 and 42.7%, respectively. In the long term, according to these results, workdays lost to strikes and inflation exerted an increasing influence on wage growth. While real GDP's influence on wage growth remained negligible, wage growth was less affected by its own momentum than in the first period. This means that after workers experienced high wage growth, they expected to get higher wage growth again in the following year. However, the real dynamic behind wage growth is shown by workdays lost to strikes and inflation, which contributed 55.4% to wage growth. In other words, they are the largest sources of change in wage growth.

In consequence, workdays lost to strikes and inflation, which are the most important factor in the wage-bargaining process, play positive roles in wage increases. Thus, these variables are important causes behind wage growth in Turkey.



4.4 Impulse response functions

Figure 6 shows the results of impulse response functions of workdays lost to strikes, inflation and real GDP on wage growth in Turkey. The parallel relationship of variables discussed for the results of forecast error variance decomposition can also be seen. For the impulse response function, confidence interval is calculated by the Monte Carlo approach because the variables, which are in the VAR model, are not stationary. In the analysis, impulses are *wdl*, *dcp*, *gdp* and *dwi* and response is *dwi*.

In Fig. 6, the response of wage growth to workdays lost to strikes runs to around 3.5 years. This shows that the workdays lost to strikes have a significant positive impact on wage growth. For the following years, the impact of workdays lost to strikes on wage growth remains positive but is not statistically significant. In addition, as seen in the figure, the response of wage growth to inflation usually has 4.5 years time span and thereafter becomes statistically insignificant. GDP's effect on wage growth is inconsiderable, but the response of wage growth to wage growth becomes statistically significant, though its significance gradually decreases in the following years. The reason why the wage index plays a significant role is hidden behind expectations of wage increases. As the workers obtain wage growth in a year, they are likely to expect increases significantly greater than, or at least on a par with, the previous year. Therefore, high wage growth creates strong anticipation even if productivity growth rates remain lower, or even if there is an economic crisis. In this section, it can be seen that industrial actions and inflation were the most important causes of wage growth.

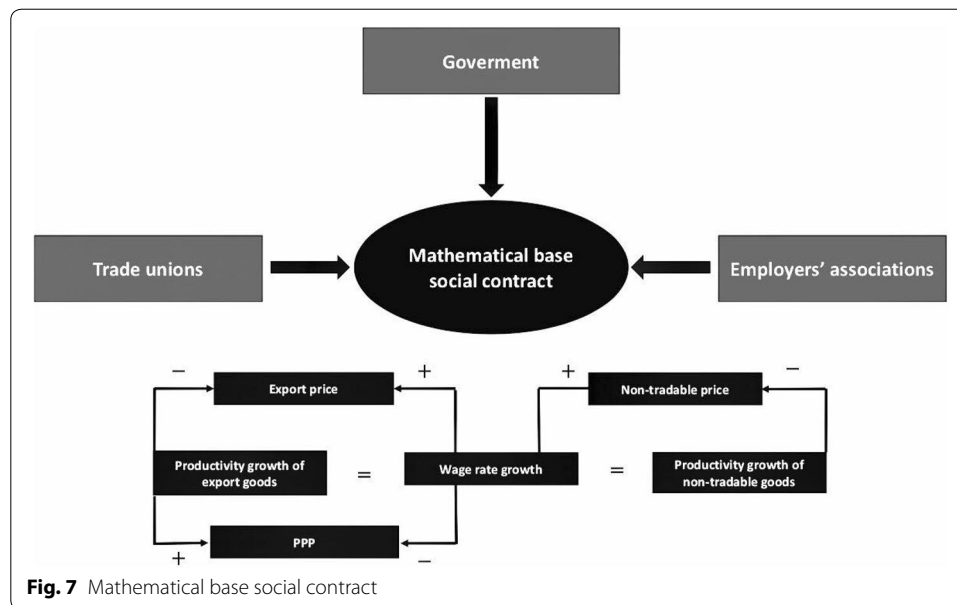
5 Discussion of political implications

The VAR analysis shows that main configurations for wage growth are industrial action resulting in workdays lost to strikes and inflation, both of which influence the wage-bargaining process in Turkey. The pressure of workers' demands on wage growth causes high inflation and unit labor cost growth and thus an unstable economy in Turkey. To eliminate these problems, new institutional changes must be taken into account based on productivity growth, since wage growth must be compensated for according to descriptive output in the economy. In the wage-bargaining process, inflation has been taken as the main figure for wage growth, and wage growth must at least be above the inflation rate to legitimize real wage growth. However, in a given year, a possible low productivity growth of non-tradable goods means much more increase in wages in the incoming year because low productivity growth can cause higher inflation. This situation then becomes a spiral and causes much higher inflation, following much higher wage growth in the economy. In addition, wage growth that is greater than the productivity growth of export goods is the main reason for possible depreciation in the exchange rate (see Sect. 2). Thus, there must be a new and revolutionary mechanism to bring an optimum increase in wage growth that could decrease high inflation, lower unit labor cost growth and create stability in the exchange rate system.

It is controversial to estimate the productivity growth of export goods in the economy. However, two methods can be used for that purpose. The first is by using the mathematical methods described in Sect. 2, where it is clearly shown how price increases can be connected with productivity growth rates. With available input–output tables, it is possible to calculate the productivity growth of export goods. The second method of estimation is the reversion to the mean. These two methods can help policy makers to decrease unit labor cost growth and inflation in the economy.

5.1 Mathematical base social contract

Wage growth that moves in parallel with the productivity growth of export goods is the desired principle level for compatible international trade and a stable exchange rate. One of the problems discussed above is wage growth in excess of the productivity growth of export goods. Industrial actions that caused workdays lost demonstrate the political power of trade unions in the Turkish economy, and this situation causes excessive high wage growth compared with productivity growth. Put another way, wage growth has not been compensated for or justified by productivity growth. This problem emerged because of two other problems. First, governments did not implement enough deregulation policies, which could have decreased wage growth and eliminated inflation, due to political costs in elections. Second, the trade unions tried to maintain their position in the Turkish economy and acted against neoliberal policies. Deregulation policies remained limited, and economic policies were easily manipulated without considering market conditions in the economy. On that point, it is important to create a balance between the trade unions and the government that directly influences wage growth. To do that, the new mechanism should not cause disparity between any of the actors' interests, but must create a social contract and create a balance between the separate interests of the trade unions, employers' associations and the government. As it stands,



the trade unions try to increase wage growth as much as they can, and the employers' associations struggle to keep wage growth as low as they can, while the government can use wage growth to attract voters in elections. Hence, a policy called the mathematical base social contract needs to be implemented. This contract can determine the optimum interests of the actors in wage-setting policy.

Figure 7 shows the mathematical base social contract. The social contract is principally used to reduce individual interests and create an optimum point for the actors. To bring sustainability for the actors in the field of wage policy in the economy, the mathematical base social contract needs to be implemented. For that to happen, a policy is required that does not cause decreasing export prices or high inflation and reduces instability in the exchange rate. In addition, implementing such a policy can give workers a chance to enjoy wage growth above the level of inflation in the export growth country. As inflation is the difference between the wage growth and the productivity of non-tradable goods, setting a wage growth level according to the productivity growth of export goods is the most favorable policy for trade unions, employers' associations and the government. By this contract, wage growth must be linked to the productivity growth of export goods. Thus, export prices do not decrease and PPP is not influenced by wage growth in the domestic market.¹⁴ Stable macroeconomic factors can bring prestige to the government. Finally, employers can enjoy lower cost growth in the economy.

5.2 Reversion to its mean as a new wage-setting policy

How to calculate effectively the productivity growth of export goods to set wage growth nationally in each year gives rise to some questions. In a country not experiencing

¹⁴ This policy will provide more sustainability for the exchange rate system. However, linking wage growth to the productivity growth of export goods can be less advantageous against export-led growth countries, since these countries do not try to create a balance between the actors of wage policy, but instead seek to eliminate trade unions influence and decrease wage growth relative to the productivity growth of non-tradable goods as much as they can.

technological change, productivity growth will be more static until reaching the technological frontier. Thus, reversion to its mean as a new wage policy is favorable. The future prediction of the productivity growth of export goods is relatively difficult. As seen in the stock market, the change of any variables inclines toward its mean after straying above or below the mean in the long run in a free market economy. Figure 1 shows the productivity growth of export goods and its mean by considering its historical fluctuation between 1973 and 2011. The historical mean of the productivity growth of export goods is 3.7%, calculated by taking into account approximately 38 years of the Turkish economy. Moreover, until the economy reaches the technological frontier, the configuration of the productivity growth of export goods is unlikely to show any great long-term shift from its mean. In Fig. 1, although the productivity growth of export goods strayed away from its historical average, in the long run, it moved closer to it and continued fluctuating around its mean. Therefore, it is desirable to consider the historical mean value of productivity growth of export goods for wage growth and estimate the flexibility of wage growth, where the two essentials should at least come to balance in the long run to reduce macroeconomic instability. To do this, wage growth, remaining above the mean, must increase at the same pace as the productivity growth of export goods and reach its mean. Nevertheless, wage growth in the Turkish economy does not show a reversion to its mean and does not move around the mean. That shows that wage growth is not flexible and is generally influenced by economic policies in the country, running counter to the productivity growth of export goods, which has not been easy to control by government interventions or industrial actions. This new wage policy is important and must be considered by the trade unions, employers' associations and the government.

5.3 New inflation policy

By considering the individual interest of the three actors, the greatest possible wage growth comes where constant export prices for international balance, low inflation, and a more stable exchange rate system can be created. This mechanism can be created by the mathematical base social contract between the three actors. The rules of the mathematical base social contract are as follows: first, the contract should be at an optimum level that reduces the individual interests of the government, trade unions and employers' associations; second, it should serve to minimize the inflation rate by narrowing the gap between wage growth and the productivity growth of non-tradable goods. However, in the Turkish economy, wage growth is determined by the inflation rate, making it impossible to reduce macroeconomic imbalances. Thus, the inflation policy of the country must be changed. In other words, wage growth should not be determined by the inflation rate but the productivity growth of export goods. In this way, Turkey could create a more stable economy.¹⁵

¹⁵ Creating this new inflation policy can also help inflation targeting policy and decrease the gap between wage growth and the productivity growth of non-tradable goods.

6 Conclusion

In this paper, high wage growth in the Turkish economy has been analyzed by considering workdays lost to strikes, inflation and real GDP growth. To determine the real dynamics behind wage growth, the VAR analysis was implemented by deriving data from variables between 1963 and 2015. According to the results of the VAR analysis, wage growth was determined largely by workdays lost to strikes and inflation, but real GDP remained an insignificant component. In consequence, workdays lost to strikes and inflation were seen to be the key factors in wage growth. As the analysis shows, industrial actions have been influential in Turkey, usually entailing wage demands in excess of the inflation rate.

In order to reduce macroeconomic imbalances in the economy, Turkey needs to change its current institutional forms. First, Turkey must implement the mathematical base social contract. According to this type of contract, in order to reduce the individual interests of trade unions, employers' associations and the government, wage growth must be indexed to the productivity growth of export goods. Second, Turkey needs to implement a new wage-setting policy, taking into consideration the reversion of the mean of the productivity growth of export goods. That means that wage policy in the country must be more flexible and be determined according to economic conditions. As the productivity growth of export goods cannot be set by a control, but rather by market conditions, wage growth must be implemented by considering the reversion of the productivity growth of export goods to its mean. Finally, a new inflation policy must be implemented for the sake of wage-bargaining policy. In other words, instead of considering the inflation rate for wage bargaining, the productivity growth of export goods must be taken into account. Hence, Turkey will be able to reduce inflation and unit labor cost growth and experience more favorable macroeconomic factors.

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The authors declare that they do not have competing interests.

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Appendix

Input–output method to calculate productivity growth rates

The productivity growth rates of the non-tradable goods and export goods were calculated by input–output tables from WIOD and TurkStat, and PPP is determined by these calculations.

$$Ax + y = x \quad (9)$$

In Eq. (9), A is the domestic technological coefficients' matrix, y represents the vector of final demand, and x is a vector that shows the level of output. This form can be written by using the I unit matrix as follows:

$$\begin{aligned} y &= x - Ax \\ x &= (I - A)^{-1}y \end{aligned} \quad (10)$$

In Eq. (10), the Leontief inverse matrix $(I - A)^{-1}$ is used to calculate the labor required to directly and indirectly produce one unit of each commodity. To measure the productivity of non-tradable goods and export goods, the following equation is used.

$$\begin{aligned} y &= (I - A)x \\ \phi x &= L \end{aligned} \quad (11)$$

In Eq. (11), x shows a column vector of the total amount of output. A represents the input coefficient matrix of the amount of domestic commodities used by the industry to obtain one unit of output. ϕ indicates a row vector of the amount of labor directly used to produce one unit of output in each industry. L shows a scalar of the total labor.

$$\phi (I - A)^{-1} = v \quad (12)$$

in Eq. (12), where v is a row vector of the amount of labor that is directly and indirectly required to produce one physical unit.

$$vy = v(N + E) = L \quad (13)$$

in Eq. (13), the amount of total domestic final demand is N , and the amount of total exports is E . The share of total domestic final demand in this total is column vectors n , and the share of exports in this total is e .

$$v_n = \sum_{k=1} v_k n_k \quad \text{and} \quad v_e = \sum_{k=1} v_k e_k \quad (14)$$

Finally, v_n and v_e are the vertically integrated labor input coefficients of non-tradable goods and export goods, respectively. These coefficients are calculated in terms of commodity base, rather than sectoral or industry base. Labor productivity is calculated by using vertically integrated input labor coefficients in both non-tradable and export. These coefficients were multiplied with price deflators.¹⁶ Decreasing coefficients means increase in productivity (Ünal 2016a).

¹⁶ The UN database "national accounts estimates of main aggregates" and "GDP by type of expenditure" categories were used to calculate deflators. v_e deflator is exports (US dollars, current prices) divided by exports (US dollars, constant prices). v_n deflator is domestic demand (US dollars, current prices) divided by domestic demand (US dollars, constant prices). $\text{Domestic demand} = \text{GDP} - \text{export} + \text{import}$.

Technical notes for calculating productivity growth

Tables from WIOD give details of domestic intermediate goods, domestic final demand, export and output. The tables show that import is separate from intermediate goods and domestic final demand. Domestic final demand, which is separate from imports, was used to calculate the productivity growth of non-tradable goods for the years 1995 and 2011. Tables from TurkStat are similar to those of WIOD. These tables include same information about domestic final demand. The input–output tables of TurkStat are used to make calculations for the years 1973 and 1990. These tables are used to calculate vertically integrated labor input coefficients of non-tradable goods and export goods.

To calculate the productivity growth of non-tradable goods, consumption (private and government) and gross capital formation (gross fixed capital formation and changes in stocks) were aggregated for the TurkStat tables. For the WIOD tables, final consumption expenditure by households, final consumption expenditure by non-profit organizations serving households (NPISH), final consumption expenditure by government, gross fixed capital formation and changes in inventories and valuables were aggregated to calculate the productivity growth of non-tradable goods. To calculate the productivity growth of export goods, exports were analyzed. The separation of non-tradable goods and export goods was executed according to the commodity base method. In other words, productivity is calculated by considering products for domestic consumption and for export.

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