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The Effect of Informal Economy on Income Inequality: Evidence from Turkey

Summary: By considering the manufacturing pay inequality index as a proxy for overall income inequality and a novel index for the informal economy, this study analyzes the relationship between income inequality and the size of the informal economy in Turkey for the first time during the period of 1963-2008. For this purpose, we employ a time-series analysis with the Johansen cointegration test, a vector error correction model and the Granger causality tests. The findings suggest that while an increase in income inequality and foreign trade competitiveness leads to an expansion of the informal sector, unemployment has negative effects on the informal sector.

Key words: Informal economy, Income inequality, Trade.

JEL: E26, J31.

This study examines the relationship between income inequality and the informal economy in Turkey. Some important consequences of informalization such as declining tax revenues, tax morality problems, unfair welfare effects on taxpayers, distortions of economic and social data, unfair price competition between firms in the formal sector and those in the informal sector, inefficient allocation of economic resources, lower standards and quality of good and services produced in the informal sector, and finally, deteriorated income distribution, have been noted in the literature (Christopher Bajada and Friedrich Schneider 2005).

In the era of the neoliberal model, the informal sector has expanded in many countries. Increasingly fierce competition in this era has forced firms in the formal sector to reduce prices and to adjust their production in order to preserve their market share in international and/or domestic markets. Hence, this higher pressure that has resulted from competition leads firms to cut down their costs, mainly labor costs. The strategy to reduce labor costs was (is) to avoid government regulations, such as avoidance of minimum wage, social security, and/or pensions.

In the case of Turkey, both the size of the informal economy and income inequality increased in the 1980s, the era in which the country adopted the neoliberal model and shifted from the import substitution to an export-led growth model. The Turkish economy has continued to evolve toward a more open economy. Therefore, it is important to investigate the possible relationship between economic inequality and the informality of the labor market.

In this study, we overcome the lack of long term income inequality data set by considering the manufacturing pay inequality index as a proxy for overall income inequality. Our aim is to analyze the relationship between increasing inequality and the size of the informal economy during the period between 1963 and 2008. To do so, we employ time-series analysis with a Johansen cointegration test, a vector error correction model (VECM) and Granger causality tests. This study is particularly relevant because it addresses the possible connection between two crucial issues in Turkey for the first time, and provides some evidence to the literature on the nexus of informality-inequality with a country-level case study.

Emphasizing the linkage between the formal and informal sectors, we argue that trade liberalization, a main policy recommendation of the neoliberal model, has led to income inequality and informalization - two phenomena which feed each other. Our main argument is that foreign trade competitiveness built upon reducing labor costs suppresses the wages for unskilled workers, leading to higher income inequality. This in turn feeds the informal economy as it increases demand for lower quality products produced in the informal sector.

Throughout the text, we adopt a general definition of skilled labor in line with its major use in the literature. Skilled workers are those who have specific skills to perform complicated tasks, obtained as a result of higher education, training and experience, which are directly reflected in relatively higher wages. Such a general and commonly used definition of skilled labor is essential to our purpose as one of the key variables, the Theil index, which basically measures the pay difference between "skilled" and "unskilled" workers.

Following this section, we present a theoretical background of possible linkages between income inequality and informalization of the labor market in Section 1. Section 2 introduces data and empirical strategy. The findings of the analysis are discussed in Section 3. Finally, the closing section is reserved to summarize our findings.

1. Literature Survey

1.1 Theoretical Background

There has been a growing interest in the role of the informal economy in the economic development process as the size of the informal economy increases. Here we consider a common definition of the informal economy as all economic activities that contribute to the officially calculated national income but are not registered (Schneider and Dominik H. Enste 2000). Informal economy can be defined as economic activities that do not comply with taxes and regulations (Roxana Gutiérrez-Romero 2007). International Labour Office (ILO) defines "informal economy" instead of the "informal sector" as "all economic activities that are - in law or practice - not covered or insufficiently covered by formal arrangements", and contends that the informal economy includes wage workers and own-account workers (ILO 2002). Since a substantial share of the informal economy is performed by informal employment, there is a significant positive relationship between informal economy and informal sector. Therefore, in this study, although we acknowledge that the informal economy

is a wider concept than informal employment, we still do not hesitate to develop our argument as we use both terms interchangeably.

Along with the adoption of the neoliberal paradigm, the informal sector has expanded in many countries, particularly in the developing world (Schneider and Robert Klingmair 2003; Uma Rani 2008). In comparing the years from 1960 to 1995, the size of informal economy has increased by 7-17 percent in major countries, even in those who have very small informal economies such as Switzerland, Austria, and the US (Schneider and Enste 2000). The increase in the size of the informal economy was a common phenomenon regardless of the types of countries or chosen approach (Schneider and Enste 2000). Atypical work (i.e. temporary, part-time or informal employment) has become a typical phenomenon today across the world. Since few decent jobs were created during the neoliberal era, the bulk of workers, who mostly were low-skilled, have been employed in low-paid atypical work, strengthening the existing labor market segmentation (Rani 2008). As a result, this situation has deteriorated income distribution in the economy by both pushing wages down overall and increasing wage inequality between skilled and unskilled workers. Olivier Blanchard and Augustin Landier (2002) show that because of a lack of upward mobility among atypical workers, the low wages and increased job insecurity cause income inequality.

Internationalization that comes with fierce competition has forced firms in the formal sector to reduce prices and adjust production according to relative prices between the formal and informal sectors in order to preserve their market share in international or domestic markets. Therefore, higher pressure on firms to maximize profits leads them to cut down their costs, mainly *via* labor costs. One main way they do so is to hide economic activities from governmental regulation so that firms can reduce tax and social security premiums "burden". These firms stay outside of labor standards such as minimum wages, decent and non-hazardous working conditions, child labor laws, etc. (Ajit Mishra and Ranjan Ray 2010).

It is argued that rigid labor legislation, inefficient tax legislation, inefficient tax systems, corruption and high registration fees are the main factors that cause and perpetuate the informal economy (Norman V. Loayza 1996; Simon Johnson, Daniel Kaufmann, and Andrei Shleifer 1997; Gutiérrez-Romero 2007). While some studies attempt to associate the expansion of the informal sector with increased government involvement, others consider rigid wages as the main cause. However, both of these models collapse since the informal economy has broadened in the neoliberal era, which is associated with deregulation, contraction of the public sector and elimination of labor market distortions (Kendall K. Schaefer 2002).

The structuralist multi-sector models assume that what causes the increase in the informal sector is inadequate demand in the formal sector (Schaefer 2002). Products of the formal and informal sectors can be considered as substitutes for each other. Informal sector production is associated with lower quality, and therefore demand for informal sector products is mainly dependent upon unequal distribution of income in the economy (Mishra and Ray 2010). Therefore, as inequality rises, demand for low quality products of the informal sector will increase, as will the sector's profit rate.

There has been a growing literature that addresses this correlation between income inequality and the informal sector. There is evidence that more unequal regions in the world have larger informal sectors (Gutiérrez-Romero 2007). Higher inequality, in the sense of a large number of wealth-constrained individuals, might cause a larger informal sector (Mishra and Ray 2010). When there is lack of access to the formal credit mechanism, these wealth-constrained individuals and firms are less likely to go to the formal sector, where the fixed costs are much higher than those in the informal sector. Therefore, since productive but wealth-constrained firms cannot enter the formal sector, insiders enjoy higher returns, thereby, higher inequality causes higher informality (Mishra and Ray 2010).

In addition, shrinking a tax and social security base means that governments who have less funds to use for the redistribution of income may yield higher income inequality. Expansion of the informal economy erodes the tax and social security bases, which in turn causes higher budget deficits and an increase in tax rates (Schneider and Enste 2000; Schneider and Klingmair 2003; Mishra and Ray 2010). As the informal sector expands, the leak for government revenue gets larger. This creates a vicious cycle because higher tax rates will create a tendency for firms and individuals to stay informal or switch to it. J. Barkley Rosser Jr., Marina V. Rosser, and Ehsan Ahmed (2000, 2003) show that for transition economies there is a strong positive relationship between income inequality and the size of the informal sector because as informal economy expands the amount of tax revenue declines, which in turn reduces the effectiveness of a government's redistribution policies. Similarly, using a global data set for 52 countries Ahmed, Rosser Jr., and Rosser (2007) show the same positive relationship. Alberto Chong and Mark Gradstein (2007) also confirm the positive relationship, in that as inequality measured by the Theil index or Gini coefficient increases, the size of the informal sector within the country increases as well. Diego Winkelried (2005) shows that higher income inequality in Mexico leads to an increased size of the informal sector. Finally, Mishra and Ray (2010)'s findings also suggest that greater inequality supports larger informality.

Gutiérrez-Romero's (2007) work on Latin America and Sub-Saharan Africa, on the other hand, shows that the "correlation" between the size of informal economy and inequality is positive for developed countries but negative in the case of developing countries. Also, Roberto Dell'Anno and Offiong H. Solomon's (2009) findings for sixteen transition countries suggest a negative relationship between the size of the informal sector and income inequality. However, the latter authors indicate that these conflicting results with earlier literature occur because there is no robust measure for the size of the informal sector.

1.2 Inequality and Informal Economy in Turkey

The informal sector has grown due to both demand and supply-side factors in the neoliberal era. On the supply-side, the migration from rural to urban areas has created an army of workers who accepted the informal employment over unemployment. On the demand-side, foreign trade competitiveness, which is built upon reducing labor costs, resulted in lower wages. Finally, increasing privatization and the declining share of public sector have fed the army of workers for the informal sector.

Based on the discussion in the previous section, we expect a relationship between the size of the informal economy and income inequality in Turkey, where an expanding informal sector suppresses wages and increases wage discrepancy in the economy, which in turn feeds the informal sector.

Inequality has both between and within elements. Regarding inequality between the formal and informal sectors, it is evident that there has been an increase in inequality. For example, Erdal Aydin, Mehtap Hisarciklilar, and Ipek Ilkkaracan (2010) found that from 1988 to 2007 while the wage gap between the average female workers and their formal sector counterparts had increased 25 percent, the one for male workers had almost tripled. Regarding inequality within the informal sector, it is also plausible to argue that there has been an increase when one takes into account two facts. First, a sizeable literature made evident that there exists a substantial gender wage gap disfavoring women (*inter alia* Ilkkaracan and Raziye Selim 2007). Second, while the share of informal male employment in non-agricultural employment was stable in the period of between 1988 and 2007, women's employment has increased about 25 percent (Aydin, Hisarciklilar, and Ilkkaracan 2010). Also, in the context of competitiveness during the 1989-2004 period, A. Burça Kızılırmak Yakışır (2012) noted two major effects on the employment levels. First, increasing competitiveness has no significant effect on employment in import oriented sectors. Second, in export oriented sectors, while it causes a decline in the level of employment in the short run, it increases employment in the long run.

Considering the above facts and the substantial size of informal economy in the country and other facts such as dominant share of textile and food sectors in export went up until the mid-2000s (Erol Taymaz, Ebru Voyvoda, and Kamil Yilmaz 2011), wages in labor-intense export sectors such as textiles had declined between 1979 and 1992 (Korkut Boratav, Oktar Türel, and Nurhan Yentürk 1996), and textile and food contributed to inequality increasingly during 1980-2008 period (Adem Y. Elveren and James K. Galbraith 2009; Elveren 2010) we presume that the major factor behind increasing inequality was downward pressure in wages of low-skilled workers.

There has been a significant upswing in attention given to the informal sector by scholars and policy makers in Turkey. Several comprehensive reports examined the causes and consequences of the informal sector (*inter alia* Devlet Planlama Teşkilatı (DPT) 2001; Turkish Confederation of Employer Associations (TISK) 2003; Sinan Ülgen and Ulaş Öztürk 2006; Ana-Maria Oviedo 2008; Kayıt Dışı İstihdamla Mücadele (KADİM) 2010; World Bank (WB) 2010; Elveren 2015). These reports point out various causes of the informality: production structure, productivity, scale of firms, demographic trend, migration, urbanization, globalization, increasing competition, taxing policy, employment policy, bureaucracy, and some socio-psychological and ethical reasons.

The informal economy began growing in the early 1980s, and growth accelerated in the late 1980s continuing throughout the following decades. For example, while the average size has increased around 25 percent according to the measures by Fethi Öğünç and Gökhan Yılmaz (2000) and Gülsüm Akalin and Ferdi Kesikoğlu (2007), the increase was as high as 170 percent with respect to the measures of Zehra

Kasnakoğlu (1993) and Funda Yurdakul (2008). Although there are various measures for the size of the informal economy, a common phenomenon is that informality has increased in the post-1980 period compared to the pre-1980 era. Aside from varying estimations as to the size of the informal economy, the official statistics show that the share of informal employment in total employment dropped from 52.9 percent in 2001 to 39.7 percent by October 2012 (Turkish Statistical Institute (TurkStat) 2013[1]). The main reason behind this phenomenon, however, is a declining share of agricultural employment in total employment, as agricultural employment is inherently informal. Since the population in the agricultural sector consists of the most unskilled labor, they are also the major source of the informal sector when they move to urban areas (Hakan Ercan 2007, pp. 78-79). In fact, the migration from rural to urban areas began in the 1950s and accelerated throughout the period as a typical result of development process that includes both push and pull factors.

In order to understand internal migration, characteristics of the Turkish agricultural sector should be considered. Turkey can be considered a resource rich country in terms of agricultural lands. However, the fragmentation of land in terms of small-sized agricultural lands has been an important problem, and small-sized farms have dominated agricultural production since the 1950s (Ahmet Şahinöz 2011, pp. 367-369). The average size of land of Turkish farms is less than one third of the size of European and US farms in recent years (Atilla Yeşilada, Murat Üçer, and İbrahim Aksoy 2010, p. 27). Even though agricultural productivity has steadily increased through time, overall agricultural productivity is still below that of developed countries as well as that in some of the developing countries at the beginning of 2010s (Şahinöz 2011, p. 380). Further, within the Turkish economy, agricultural productivity lags the productivity levels of industry and service sectors as well as overall GDP (Yeşilada, Üçer, and Aksoy 2010, p. 18). Moreover, the number of persons working in the agriculture and the size of total cultivated land have declined in the last two decades (Yeşilada, Üçer, and Aksoy 2010, p. 20).

Since the change in the agricultural subsidy programs in 1999 there has been a steady and rapid decline in agricultural employment as the labor force shifts from the agricultural sector (with 85 percent of informality in 2009) to mainly service sector (with 30 percent informality in 2009) in urban areas (Tuncer Bulutay and Enver Taştı 2004; WB 2010; TurkStat 2013). However, the migration of the less-educated population from rural to urban areas increased the informal employment in non-agricultural sectors in the early 2000s (Ercan 2007, p. 79; WB 2010, p. 10).

In fact, formality and informality are intertwined and internal migration is not the only correlation here. It is very difficult to separate these two, as "it's a matter of level" of the degree of informality rather than a "dichotomous" process (WB 2010, p. 53). And even fully-formal firms can have important linkages with informality through: (1) value-chains; (2) subcontracting some of their activities to informal firms; (3) buying services from their *tacherons* or jobbing activities (Zeynep Başak 2005, pp. 100-104; WB 2010, pp. 53-54). In this respect three types of informality can be defined: i.e. fully-formal, fully-informal, and semi-formal (underreport) firms.

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[1] **Turkish Statistical Institute (TurkStat).** 2013. İstihdam, işsizlik ve ücret istatistikleri. www.tuik.gov.tr (accessed April 01, 2013).

Also, informal firms can be registered firms that underreport sales and employment (WB 2010, pp. 14-15).

There is a tandem pattern for informalization and inequality in Turkey. The expansion in the informal sector has created a leak in tax revenues and social security premiums, which in turn deteriorates income distribution as less funds are available to the government for income redistribution policies. On the other hand, increasing income inequality sustains demand for cheaper products of the informal economy, boosting the informal sector. That is, income inequality is both the cause and the consequence of informality.

The taxation system in Turkey also creates incentives for the expansion of the informal economy (Ayşegül Mutlu and Mustafa Çelen 2012, p. 14). This taxation system is not source based, and the share of indirect taxes is more than 60 percent of all tax revenues; this is a very high share compared to the Organization for Economic Co-operation and Development (OECD) average of 30 percent (Mutlu and Çelen 2012, p. 13). As a result, individuals and businesses tend to underreport their transactions for tax purposes. Though there have been many attempts by the Ministry of Finance to overcome this problem, such policy changes often create political pressures and thus there is a reluctance of behalf of policy-makers as well (Mutlu and Çelen 2012, pp. 25-26).

Increasing income inequality both between and within countries in the neoliberal era since the early 1980s has been a crucial debate (Galbraith 2007). Turkey, too, has experienced increasing income inequality particularly since the late 1980s (Elveren and Galbraith 2009). The volume of foreign trade also boomed in the era when the Turkish economy switched from an import substitution model to an export-led model in 1980 (see Figure 1).
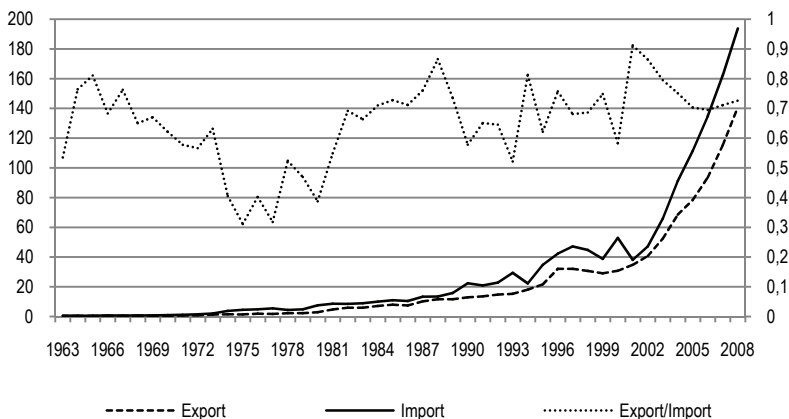

Source: Based on data by World Bank (2013)[2].

Figure 1 Volume of Foreign Trade, 1963-2008 (Billion Dollars)

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[2] **World Bank (WB).** 2013. World Development Indicators. http://data.worldbank.org/data-catalog/world-development-indicators (accessed April 01, 2013).

Even though exports seemed to increase faster than imports during the early 1980s, this improvement in export performance was due to improvement in labor productivity and suppression of labor costs during the aftermath of military *junta* of 1980 (Erinç Yeldan 2001). As labor militancy and wages started to rise in the late 1980s (see Figure 2), Turkish export performance against imports could only improve in 1994 and 2001 with major devaluations of the currency. In addition, the customs union agreement with the EU could not change this trend either. The integration of the Turkish export with the global economy relied on low wages and currency devaluations (Yeldan 2001; Ercan 2007; Taymaz, Voyvoda, and Yilmaz 2011).
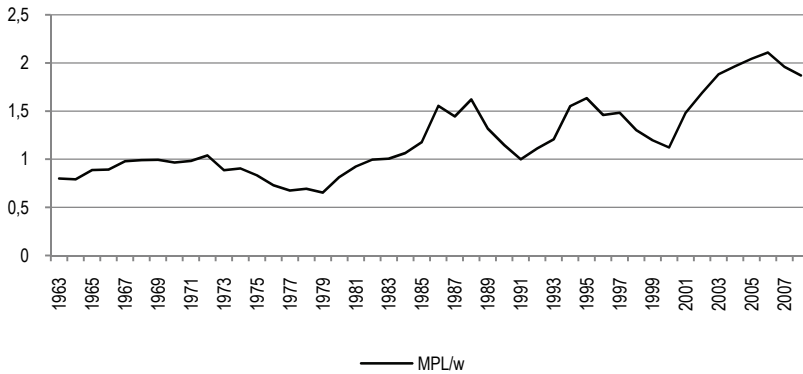
Figure 2 Ratio of Marginal Product of Labor to Real Wages

There is a sizeable body of literature that provides comprehensive analyses on the impact of internationalization on pay/income inequality in Turkey (*inter alia* Nilüfer Çağatay 1986; Boratav 1990; Kızılırmak Yakışır 2003; Elena Meschi, Taymaz, and Marco Vivarelli 2008; Özlem Onaran 2009; Pınar N. Emirhan and Gonca Konyalı 2010; Nursel Aydıner-Avşar 2011; Cem Oyvat 2011). Utilizing various methods and dealing with different time periods, these studies in general show the positive impact (i.e. increase) of trade openness, export, and FDI on the wage gap between skilled and unskilled workers.

While the exports mainly relied on agricultural products in the 1970s, the engine of the export in the 1980s was the labor-intensive garment and textile sectors. Since the mid-1990s, the medium-technology industries like automotive, machinery and equipment have become major exporting sectors. However, since the country has specialized on slow-growing sectors with low relative prices, sustaining competitiveness was made possible by cheap labor (Yeldan 2001; Taymaz, Voyvoda, and Yilmaz 2011). As a matter of fact, throughout the period, labor-intense export sectors such as garment and textiles have declined, while earnings of relatively higher capital-intensive import substitution sectors such as transportation have increased (Boratav, Türel, and Yentürk 1996; Elveren and Galbraith 2009). As Figure 2 shows, during the period in question, the gap between productivity of labor and real wages has widened. However, even in the periods of improvement in the share of labor, pay

inequality has continued to increase, suggesting that low-skilled workers were the ultimate losers. Therefore, it would not be wrong to argue that those ultimate losers were employed in the informal sectors, mainly in exporting sectors such as textiles and in some secondary sectors with which relatively better-paid medium-technology exporting sectors -such as automotive- have backward linkages.

A large part of literature on the informal economy in Turkey focuses on its measurement. There are fewer works, on the other hand, dealing with the relationship between the informal economy and some other macroeconomic issues such as determinants of informal hiring (Fatih Savasan and Schneider 2006), economic fluctuations (Adem Kalca and Aykut Ekinci 2008), growth (Akalin and Kesikoğlu 2007), and public debt sustainability (Ahmet B. Yereli, İ. Erdem Seçilmiş, and Alparslan Başaran 2007), and others show the wage gap between informal and formal sectors (Ercan and İnsan Tunalı 1998; Aysit Tansel 2000; Haluk Levent, Enver Taştı, and Didem Sezer 2004; Aydin, Hisarciklilar, and Ilkkaracan 2010; Tansel and Elif O. Acar 2012).

However, to the best of our knowledge, there is no study investigating the relationship between the informal sector and income inequality in Turkey. This study is an attempt to fill this gap in the literature on Turkey. This study is relevant since it is a primary direct attempt to analyze two crucial issues, informal economy and income inequality in Turkey. A novelty of this paper is utilization of a manufacturing pay inequality data set that allows us to deal with a longer time period (i.e. 1963-2008) that covers both the pre- and post-neoliberal model.

1.3 Hypothesis

Based on the above literature and stylized facts our main hypothesis is that an increase in income inequality as a result of foreign trade competitiveness leads to an expansion of the informal sector.

The reason is that foreign trade competitiveness is built upon reducing labor costs, and to the expanding the informal sector, where mostly small-sized firms with low productivity operate. These firms have export competitiveness as a function of low labor cost, which in turn suppresses the wages and increases the wage gap between skilled and unskilled workers in the economy. This inequality, in turn, feeds the informal economy *via* higher demand for lower quality products produced in the informal sector. It is a fact that informality is more commonly found in the agricultural sector and among small-sized firms, who are operating in domestic markets. Exporting companies, on the other hand, are mainly large-sized and located in the formal sectors. Despite these facts, however, we still argue that there is a significant relationship between the tradable sector and informality through value-chains. The value-chain refers to the different phases of informality that is observed from the initial stage of production through final consumption (WB 2010). The undervaluation of real estate for tax purposes at the initial stage of production, the lack of invoicing in the agricultural sector, (for example, when the firm owner purchases agricultural goods), and, finally, the underreporting the number of employees engaged in production can be considered as examples of chains of informality (WB 2010). The small and medium-sized enterprises (SMEs), which constitute more than 99 percent of all enterprises, account for only 40 percent of total import, and as high as 60 percent of

total exports in Turkey in 2009 (TurkStat 2013). It is worth noting the substantial distinction in average labor costs between SMEs and large firms. In 2008, for example, the costs were almost two times higher for the enterprises with 500-999 employees than the ones with 10-49 employees (TurkStat 2013).

2. Data and Methodology

2.1 Data

■ **The Size of Informal Economy**
There are several studies measuring the size of the informal economy in Turkey. It is possible to derive some different sets that cover the time period in question. For example, a combination set of Kasnakoğlu (1993) covering the 1963-1990 period and of Yurdakul (2008) covering the 1985-2006 would be an alternative set since these studies use the same method (i.e. the currency demand) and the correlation coefficient of overlapping years of informality indices is as high as 0.96. Also, in the same manner, one could use the data sets provided by Öğünç and Yılmaz (2000) and Akalin and Kesikoğlu (2007), where the authors use the simple currency ratio method and the correlation coefficient is 0.97.

However, we prefer to utilize the shadow economy index provided by Elgin (2012) for the period of 1950-2009, *SHAD*. The author uses the dynamic multiple indicators multiple causes (DYMIMIC) estimation method that is commonly preferred in measuring the size of an informal economy in the literature. As discussed in Elgin (2012) this method provides more stable and reliable results than those previously used methods. As the variables that those methods require are either not reliable or missing, the results of previous literature on the size of the informal economy do not provide consistent results as is evident with very diverse trends between sets and excessively significant fluctuations can be seen from one year to another within the sets (Elgin 2012, p. 8).

■ **Unemployment**
Unemployment statistics, *UNEMP*, for the period of 1963-1979 are provided by Bulutay (1995), and the rest of the period is obtained from the TurkStat (2013).

■ **Foreign Trade Competitiveness**
We use the exports to imports ratio, *XDM*, as a proxy for Turkish foreign trade competitiveness. Export and import data are provided by the WB (2013).

■ **Income Inequality**
Following Galbraith and Hyunsub Kum (2005) we consider the manufacturing pay inequality index, *THEIL*, as a proxy for the general pay inequality in the economy, where the authors show that after controlling for survey type and the share of manufacturing employment in a population, industrial pay inequality has greater consistency across time and countries than the Klaus Deininger and Lyn Squire (1996) set. In fact, the authors also state that there are several major studies which use wage inequality as an alternative to income inequality (Galbraith and Kum 2005, p. 124). Therefore, we use the data set of Elveren (2012). The index is constructed by calculating the between-group Theil's *T*-statistic over the Annual Manufacturing Industry

Statistics (see University of Texas Inequality Project 2013 for details for calculation). We acknowledge that wage inequality does not cover inequality resulted by non-wages incomes, and the share of the manufacturing sector has been in constant decline since 1980. That is, our inequality measure does not reflect the actual inequality and excludes the service sector in which informality is more common compared to the manufacturing sector. However, this does not invalidate our argument. In fact, it is plausible to argue that "actual" inequality would be higher if those non-wage incomes (i.e. interest earnings) could be taken into account. That is, our inequality index presents the lower bound of actual inequality. Also, regarding the post-2002 period for which Gini coefficients are available, the simple correlation coefficient between Gini values and Theil values are as high as 0.777, suggesting a significant power of our inequality measure.

2.2 Method

We use two time-series analysis for the statistical relationship between the size of the informal economy, inequality, foreign trade competitiveness and unemployment rate. Our sample covers the years between 1963 and 2008. Our aim is to check whether a long term relationship can be found between the size of the informal economy, inequality, foreign trade activities and unemployment rate. For the long run relationship, cointegration analysis and a VECM will be used. As Taymaz, Voyvoda, and Yilmaz (2011) suggest, Turkey's foreign trade competitiveness benefits from low labor costs, and informal economic activity is a sure method for cutting labor costs down. For this reason, we will use exports to imports ratio as a proxy for Turkish foreign trade competitiveness (it is worth noting that the analyses are repeated with $(X + M) / GDP$ and found consistent results). We also incorporate unemployment into the model in order to see its possible effect on the informal economy.

Our variables are the index for the size of the informal sector (*LSHAD*), Theil inequality index (*LTHEIL*), proxy for foreign trade competitiveness (*LXDM*), and unemployment rate (*LUNEMP*), all variables are annual and in natural logarithms.

The ADF unit root test is used to check whether variables are stationary or not. According to test results all our variables have unit roots, but the first differences of the variables are stationary (see Table 1).

Table 1 Unit Root ADF Tests

	Constant	Trend and constant
Level		
LSHAD	-3.113* [5]	-3.036 [5]
LTHEIL	-0.977 [2]	-2.801 [0]
LXDM	-2.004 [1]	-3.213 [0]
LUNEMP	-2.384 [0]	-2.592 [1]
First difference		
LSHAD	-5.019** [0]	-4.963** [0]
LTHEIL	-6.912** [1]	-6.859** [1]
LXDM	-9.827** [0]	-9.827** [0]
LUNEMP	-5.734** [0]	-5.782** [0]

Note: The figures in brackets represent the number of lags according to AIC. * significant at the 5% confidence level; ** significant at the 1% confidence level.

Source: Authors' calculation.

Since all the variables are integrated of order one, i.e. I(1), cointegration rank tests can be used for the investigation of a long term relationship among these variables. Once a cointegrating vector is found, a vector error correction mechanism can be defined as follows:

$$\Delta X_t = \alpha\beta' X_{t-1} + \Gamma \Delta X_{t-1} + \mu + \varepsilon_t. \tag{1}$$

In Equation (1) Γ is the matrix of estimated parameters, β is cointegration vector, and α is adjustment coefficient matrix.

3. Results and Discussion

A Johansen cointegration test is conducted with respect to Equation (1) above. As reported in Table 2, both Trace and Maximum Eigenvalue tests show there is at least one cointegrating vector for our variables.

Table 2   Unrestricted Cointegration Rank Tests

Lag	H₀	λ_{Trace}	Critical values (5%)	λ_{Max}	Critical values (5%)
4	r = 0	49.671	47.856	28.759	27.584
	r ≤ 1	20.911	29.797	13.621	21.131

Source: Authors' calculation.

As cointegration tests reveal the existence of a cointegration vector, a VECM is estimated for *LSHAD*, *LTHEIL*, *LXDM*, and *LUNEMP*. The first row of Table 3 shows the cointegration vector and the second row is for the *t*-values of the variables. According to these results, inequality and foreign trade competitiveness both have positive relations, and unemployment rate has a negative relationship with the informal economy. These results are in line with our expectations. Although it is not possible to make a direct comparison with panel data studies (such as Rosser Jr., Rosser, and Ahmed 2000, 2003; Ahmed, Rosser Jr., and Rosser 2007) or even with single country studies as they utilize differing methods or data (for example, Winkelried 2005 on Mexico), it still can be argued that our findings, the positive linkage between income inequality and informal sector, is in line with the earlier findings in the literature. Moreover, our finding is in line with Chong and Gradstein (2007), which utilized the Theil index as we do so. On the other hand, our results differ from Gutiérrez-Romero (2007), finding a positive correlation for developed countries but a negative correlation for developing countries, and Dell'Anno and Solomon (2009), finding a negative relationship for sixteen transition countries. This, as a matter of fact, underscores the importance of the single country studies in better understanding the relationship between the variables in question, as heterogeneity between the economic structure of the countries in panel data context may cause problems.

The adjustment coefficients in Table 3 show how the adjustment takes place as variables deviate from the long run equilibrium. The analysis of adjustment coefficients can provide useful information for determining whether a variable is endogenous or does not react to deviations (Søren Johansen and Katarina Juselius 1994, p. 31). The adjustment coefficients for *LSHAD* and *LTHEIL* are negative and statistical-

ly significant; i.e. it responds to discrepancies from the long run equilibrium relations. The adjustment coefficient of *LSHAD* is very close to minus one, which means that the speed of adjustment is high but it does not fully adjust to the equilibrium in one period. On the other hand, the adjustment coefficient of *LTHEIL* is less than minus one, which means that this variable "over-adjusts" and passes to the other side of the equilibrium. Other adjustment coefficients for *LXDM* and *LUNEMP* are statistically insignificant. Thus, *LSHAD* and *LTHEIL* are responding to a discrepancy and other variables do not, but *LSHAD* is the only variable that adjusts to the equilibrium.

Table 3   Estimation Results for VECM

	LSHAD	LTHEIL	LXDM	LUNEMP	Constant
Unrestricted cointegrating vector:	1.000	-0.039	-0.455	0.463	-4.788
t-values		(-2.544)*	(-12.518)**	(14.338)**	
Adjust. coefficients	-0.888	-2.512	-0.87	-0.153	
t-values	(-3.596)*	(-3.369)*	(-1.444)	(-0.421)	
	Test statistic	*p*-value			
Portmanteu	189.775	0.45			
LM	17.645	0.345			
Lomnicki-Jarque-Bera[1]	3.796	0.875			
Lomnicki-Jarque-Bera[2]	3.097	0.928			
Multi. ARCH	97.4198	0.554			

Note: * significant at the 5% confidence level; ** significant at the 1% confidence level. [1] Jurgen A. Doornik and Henrik Hansen (1994); [2] Helmut Lütkepohl (2004).

Source: Authors' calculation.

Formal Granger causality tests are also used to check if variables Granger cause each other. These tests are investigated in the framework of VECM of Table 3. These tests reveal that *LTHEIL* and *LXDM* Granger cause *LSHAD*, but *LUNEMP* does not Granger cause *LSHAD*, and all variables jointly Granger cause *LSHAD*. As *LSHAD* does not Granger cause other variables, the test results are omitted, but authors can supply these results upon request. It is also worth noting that as Lütkepohl (2004, p. 147) argues that researchers should be careful in interpreting Granger causality tests, especially within a higher dimensional system, as there may be indirect causality between two variables through a third one. We do not exclude such different possibilities of causality, and instead of using Granger causality test by itself we choose to interpret test results with the estimated VECM.

Table 4   VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: *D(LSHAD)*

Excluded	Chi-sq	Df	Prob.
D(LTHEIL)	16.05764	4	0.0029
D(LXDM)	9.528736	4	0.0492
D(LUNEMP)	4.229622	4	0.3758
All	37.06195	12	0.0002

Source: Authors' calculation.

Granger causality results for *LTHEIL* and *LXDM* show that the lag values of these variables are correlated with lead values of *LSHAD*. These results do not say the final words for causality, but support our VECM results, which demonstrate a long run relationship between our variables. *LSHAD* is responsible for error correcting to discrepancies from long run equilibrium. Similarly, *LSHAD* may be Granger caused by other variables both directly and indirectly.

Overall, our results suggest that there is a statistically significant long term cointegration between the variables in question, in that while increases in *X/M* and income inequality lead to expanding the informal sector in the economy, the fall in unemployment is associated with a smaller informal sector.

By adopting the neoliberal model in 1980, Turkey shifted from an import substitution to an export-led growth model. The volume of foreign trade increased substantially in this era, as demonstrated in Figure 1. The weighted average tariff rate dropped to 20.7 percent in 1994, from 75.8 percent in 1983. Then, it dropped further to 10 percent when the customs union agreement with the EU came in force in 1996 (Taymaz, Voyvoda, and Yilmaz 2011). Particularly after the liberalization of foreign capital accounts in 1989, the volume of import increased substantially in line with the growth pattern, with three slowdowns in 1994, 1999 and 2001.

Increasing trade openness has come at a cost. A vast amount of literature shows that export-led growth in the post-1980 era has come with high and steady unemployment rates, increasing wage inequality (*inter alia* Çağatay 1986; Kızılırmak Yakışır 2003; Meschi, Taymaz, and Vivarelli 2008; Elveren and Galbraith 2009; Elveren 2010), decreasing wage share (Onaran 2009) and suppressed real wages compared to steady increase in labor productivity (see for example Voyvoda and Yeldan 2001; Emel Memis 2007a; Elgin and Kuzubaş 2012) that increase profit rates (see for example Benan Eres 2005; Memis 2007b), which altogether deteriorate income distribution throughout the period.

Fierce competition in international (as well as in national) markets has forced firms in Turkey to cut down costs, mainly *via* labor costs, by staying out of the formal sector. A business can be in the informal sector in two different ways: it may not register at the tax offices to avoid tax payments, or it may not register its workers at the social security institution to avoid social security premiums. Some firms may be formal with respect to tax purposes, while its employees are working on the informal side.

The average labor cost for employers in Turkey ($25,323) is far below the OECD average ($42,960), but higher than Estonia, Poland, Slovak Republic, Chile and Mexico. Regarding total social security contributions (employee + employer), Turkey (27 percent), on the other hand, is above the OECD average (23 percent), setting higher social security contributions than 18 major countries (OECD 2012). Moreover, while Turkey has an OECD average employer contribution rate, the rate for an employee is much higher than OECD average, only lower than six countries. This may be a substantial discouragement, particularly for workers who prefer being in the informal sector. Unreported and underreported workers are paid less, and overall unit labor costs for these workers are significantly smaller, thus, these factors lead to the rise of inequality among the labor force. Therefore, a rise in inequality and a

rise in foreign export competitiveness are positively related with the rise in the size of the informal sector.

Moreover, our findings presented in Table 3 also suggest that a higher level of unemployment shrinks the informal sector. This finding conflicts with the common case, in which those who lost their jobs switch to the informal sector, causing expansion of the informal sector. That is, higher levels of unemployment should be followed by an increase in the size of the informal sector. However, our finding that higher unemployment causes a decline in the informal sector is highly consistent with the structure of the industry in Turkey.

In fact, the informal sector has expanded due to continually high levels of unemployment in the post-1980 era (the average rates of unemployment were 4.3 percent in 1960s, 7.9 percent in 1970s, 7.98 percent in 1980s, 7.4 percent in 1990s, and 8.4 percent in 2000s), and the lack of proper investigation mechanisms. Workers in the informal sector are the most vulnerable part of the labor force during a recession. By definition they do not have formal job contracts with severance payments, thus it is easier or less costly to fire these workers. Therefore, in the case of Turkey, it is observed that in recession periods the most severe job losses have taken place in the informal sector because informality is not only common in the garment and textile sector, but also in the secondary sector that feeds formal exporting sectors of household appliances and automotives (Ercan, Taymaz, and Yeldan 2010). As a result of this linkage, when the economy grows *via* export competitiveness, the informal sector also expands and the unemployment rate declines. During contractions, the opposite takes place.

4. Conclusion

Considering the fact that both the size of the informal economy and income inequality have increased in line with the transformation of the economy toward a more market-oriented one since the early 1980s, we examine the possible relationship between these two issues in Turkey. Since the informal sector is an alternative for those low-skilled workers who cannot find a job in the formal sector and therefore are willing to accept inferior working conditions and lower pay, there is a strong relationship between the informal sector and income inequality. Moreover, shrinking tax and social security premium revenues contribute to inequality as the government has limited funds for welfare programs that are meant to improve income distribution. Finally, a more unequal economy causes a larger informal sector since it is the poor who demand cheaper products from the informal sector.

We argue that foreign trade competitiveness built upon reducing labor costs reduces the wages for unskilled workers, causing higher income inequality. This in turn promotes the informal economy due to higher demand for lower quality products produced in the informal sector. Although informality is customarily associated with the agricultural sector and small-sized firms which operate in domestic markets, rather than large exporting companies, there is a significant relationship between the tradable sector and informality since the intermediate goods for exporting companies are mainly provided by these small-sized firms.

Our findings provide strong evidence on the linkage between foreign trade competitiveness, unemployment, income inequality and informalization. While increases in X/M and income inequality lead to an expanding informal sector in the economy, a fall in unemployment is associated with a smaller informal sector. These results are consistent with our expectations and other studies' findings in general. The Turkish economy shifted from an import substitution to an export-led growth model in 1980. A substantial increase in foreign trade volume in the post-1980 era not just led to informalization but also higher income inequality, which in turn feeds informalization. In order to protect their competitiveness, firms have remained out of the formal sector. Also, as large formal firms in exporting sectors have backward linkages with those in the informal sector, the size of the informal sector has grown. A larger portion of the labor force, which are less educated and less-skilled, has been employed in the informal sector mainly characterized by lower wages. In addition to skilled-biased technological change, this pattern created a more skewed income distribution between low- and high-skilled workers. On the other hand, since this deteriorated group has increased the demand for products of the informal sector, increasing the profitability has encouraged informalization. Finally, our findings suggest a negative relationship between the rate of unemployment and the size of informal sector. Due to substantial backward linkages in which informal firms in secondary sectors feed formal exporting sectors of household appliances and automotives, in recession periods the most severe job losses have taken place in the informal sector in Turkey.

We acknowledge the fact that the linkage between income inequality and informalization deserves more attention and further examination as it has a complicated structure, particularly in a country like Turkey. However, the initial evidence provided in this study has shed some light on the issue and confirms the necessity of further research on the topic.

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