Labor productivity in manufacturing vs. construction in Turkey: A few puzzles

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Özet:

Bu notun amacı Türkiye'de imalat sanayi ile inşaat sektöründe işgücü verimliliğini kıyaslarken karşılaşılan bazı muammalara dikkat çekmektir. Yeni milli gelir serileri ile hesaplandığında, inşaat sektöründe cari fiyatlarla işgücü verimliliği imalat sanayinden yüksek görünmektedir. Türkiye bu anlamda sıra dışıdır. Uluslararası kıyaslama yapıldığında milli gelir seviyesi Türkiye ile benzeşen ülkelerde imalat sanayiinin inşaat sektörüne göre daha verimli olduğu ortaya çıkmaktadır. Sadece Sahraaltı Afrika ülkelerinde inşaat sektörü işgücü verimliliği imalat sanayiine göre daha yüksek çıkmıştır. Türkiye'deki bu sıra dışı durumun sadece farklı sektörel enflasyon oranlarından kaynaklanmadığı görülmektedir. Yıllık Sanayi ve Hizmet İstatistikleri (YSHİ) verilerine göre ise imalat sanayii verimliliği incelenen yıllarda inşaat sektörü verimliliğinden yüksektir. Fakat YSHİ verilerinde inşaat sektöründeki verimlilik artış oranlarının sadece yeni değil aynı zamanda eski GSYİH serilerinin de gerisinde kaldığı görülmektedir. İmalat sanayinde ise mikro verilerden ve GSYİH serilerinden hesaplanan verimlilik artış oranları birbirine daha yakındır.

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Abstract:

The aim of this note is to highlight some puzzles one faces when he compares labor productivity in construction and manufacturing industry in Turkey. Under new GDP series labor productivity in construction sector is larger than that in manufacturing. In comparison to countries with similar levels of per capita income Turkey looks like an outlier because it diverges from its peers where manufacturing is more productive than construction sector. Only Sub-Saharan Africa has more productive construction sector compared to manufacturing. The role of sectoral prices on this puzzle is limited. The micro data, Annual Industry and Service Statistics (AISS), does not solve this puzzle because according to this data source manufacturing sector is more productive than construction sector for the period 2005-2015. When the focus is on two sectors separately, one can observe that labor productivity growth in construction sector under micro data remains far behind its counterparts under new and old GDP series while these three productivity growth rates are similar in manufacturing sector.

I.   Introduction

One of the important consequences of the revision of the national accounts in Turkey is reflected in the calculation of sectoral labor productivities. Atiyas and Taşpınar (2017) showed that labor productivity in current prices in the construction sector is higher than that in manufacturing in 2009 and 2015, when labor productivities in these sectors are calculated by using revised GDP series (new GDP series). However, the opposite is true when labor productivities are calculated by using previous GDP series (old GDP series). In this note we make a few additional observations about labor productivity in these two sectors: First, we compare labor productivity calculated from the national income series to that calculated from micro data. Second, we compare the ratio of labor productivity in these two industries to that in other countries for which data is available.

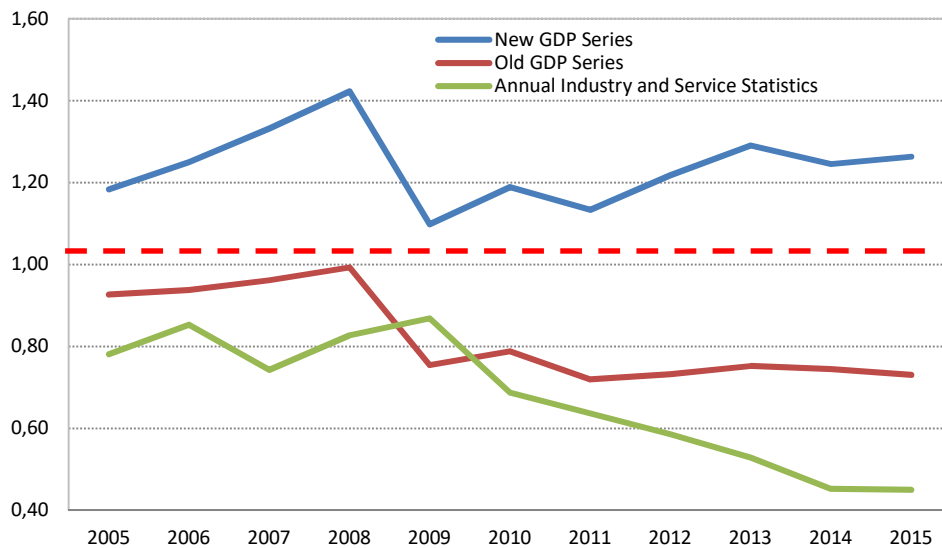## II.   Labor Productivity in the Manufacturing and Construction Sectors

We calculate the ratio of labor productivity in current prices in the construction sector to that in manufacturing for the period between 2005 and 2015. A ratio larger than 1 means that labor productivity in construction sector is larger than its counterpart in manufacturing sector. We calculate three different labor productivity ratios. We use the new GDP series for the first and the old GDP series for the second. In these ratios, labor productivities are calculated as sectoral GDP in current prices divided by employment. In these ratios, employment data are taken from Household Labor Force Surveys. Labor productivities used in the third ratio are calculated from the Annual Industry and Service Statistics (AISS) which is also provided by Turkstat, and they are given by value added per employee. The AISS is a firm-level data set; the ratio is calculated on the basis of sectoral aggregates reported in TUIK's website.

The three series of sectoral labor productivities as well as the ratios are given in Table 1. The first ratio is always larger than 1 for the whole period, while the other two ratios are lower than 1. This implies that labor productivity in construction sector is larger than that in manufacturing sector under new GDP series. Figure 1 makes this observation clearer. It shows that although ratio 1 and ratio 2 have a similar turning points across time, ratio 1 is always larger than 1 while ratio 2 is always lower. Similarly, ratio 3 is also always lower than 1 but also its break points are different from those of ratio 1 and 2. Both, ratio 1 and 2 are subject to a sharp decrease in 2009 and they stabilize thereafter. However, in 2011 ratio 1 starts to diverge from ratio 2 because labor productivity in the construction sector relative to the manufacturing sector increases under new GDP series while it is stable under the old series. On the other hand, ratio 3 is subject to a sharp decline in 2010 and it continues to decrease until 2014.

Table 1. Labor Productivity in Construction Sector and in Manufacturing Sector

	New GDP Series			Old GDP Series			Annual Industry and Service Statistics		
	LP in MAN	LP in CONS	Ratio 1	LP in MAN	LP in CONS	Ratio 2	LP in MAN	LP in CONS	Ratio 3
2005	29,306	34,694	1.184	28,579	26,488	0.927	26,476	20,682	0.781
2006	34,141	42,678	1.25	32,768	30,712	0.937	31,561	26,917	0.853
2007	37,402	49,833	1.332	35,522	34,179	0.962	32,045	23,804	0.743
2008	39,549	56,291	1.423	37,226	36,978	0.993	36,894	30,521	0.827
2009	40,388	44,380	1.099	38,308	28,907	0.755	37,423	32,505	0.869
2010	42,950	51,071	1.189	41,866	32,990	0.788	38,697	26,616	0.688
2011	54,535	61,841	1.134	49,635	35,708	0.719	45,366	28,874	0.636
2012	58,475	71,253	1.219	51,528	37,714	0.732	42,409	24,855	0.586
2013	65,827	84,950	1.291	53,802	40,498	0.753	49,600	26,219	0.529
2014	69,551	86,639	1.246	56,027	41,718	0.745	54,669	24,733	0.452
2015	78,823	99,589	1.263	61,428	44,874	0.731	66,384	29,873	0.450

Figure 1. Labor Productivity Ratios (LP in CONS/LP in MAN)

III.   Relative Labor Productivity Across Countries

What is the international evidence regarding the relative labor productivities of the construction and manufacturing industries? Sectoral GDP and employment data are available in the Groningen Growth and Development Center (GGDC) Database. The GDCC 10-Sector database provides data on value added, employment and output deflators for 10 sectors across for a

diverse set of countries.[3] Table 2 shows the ratio of labor productivity in the construction sector to that in manufacturing for countries provided in the GGDC Database. The table shows the arithmetic average of annual ratios over the period 1998-2010. For countries other than Turkey, labor productivity is calculated as value added in current prices divided by employment. For Turkey current price output series is used and labor productivities are calculated by using both new and old GDP series. The table lists countries in the order of declining ratios. When the new GDP series are used in the calculation of labor productivity, Turkey has the eighth highest ratio after Bostwana, followed by Hong-Kong. When relative labor productivity is calculated by the old GDP series, Turkey's ranking becomes sixteen and it has the same relative labor productivity with Italy.

Table 2. Labor Productivity Ratios across Countries (average over 1998-2010)

		1998-2010
ETH	Ethiopia	3.92
GHA	Ghana	2.65
TZA	Tanzania	1.94
KEN	Kenya	1.67
ZMB	Zambia	1.56
NGA	Nigeria	1.32
BWA	Botswana	1.09
TUR	Turkey (new)	1.06
HKG	Hong Kong	0.97
IND	India	0.93
ESP	Spain	0.90
FRA	France	0.90
DNK	Denmark	0.88
PER	Peru	0.87
ITA	Italy	0.84
TUR	Turkey (old)	0.84
SEN	Senegal	0.82
COL	Colombia	0.78
NLD	The Netherlands	0.77
SWE	Sweden	0.73
MUS	Mauritius	0.73
GBR	United Kingdom	0.70
IDN	Indonesia	0.69

[3]Timmer, M. P., de Vries, G. J., & de Vries, K. (2015). "Patterns of Structural Change in Developing Countries." In J. Weiss, & M. Tribe (Eds.), Routledge Handbook of Industry and Development. (pp. 65-83). Routledge. See also http://www.rug.nl/ggdc/productivity/10-sector/

VEN	Venezuela	0.68
USA	United States of America	0.68
MEX	Mexico	0.67
CHL	Chile	0.67
KOR	South Korea	0.65
JPN	Japan	0.62
BRA	Brazil	0.55
CRI	Costa Rica	0.54
MOR	Morocco	0.51
ARG	Argentina	0.46
CHN	China	0.44
MWI	Malawi	0.43
PHL	Philippines	0.40
SGP	Singapore	0.39
ZAF	South Africa	0.36
TWN	Taiwan	0.36
BOL	Bolivia	0.35
EGY	Egypt	0.33
MYS	Malaysia	0.33
THA	Thailand	0.26

Note: The table shows the ratio of current-price labor productivity in construction to that in manufacturing averaged over the period 1998-2010.

Table 3 provides the same information on a regional basis. Regional relative labor productivities (again, in current prices) are obtained by weighting countries' relative labor productivities in that region by the share of their GDP in the region's total GDP. Total GDP for each region is equal to the sum of country GDPs available in GGDC database. Table 3 shows that Turkey is positioned after Sub-Saharan Africa irrespective of which GDP series is used in the calculation of labor productivity. By contrast, in Europe, North America, Latin America, Asia and the Middle East the manufacturing sector is more productive than the construction sector. In addition, in Asia and the Middle-East the productivity gap between these two sectors is larger compared to other regions.

Table 3. Labor Productivity Ratios across Regions (weighted average over 1998-2010)

	1998-2010
Sub-Saharan Africa	1.15
Turkey (new)	1.06
Turkey (old)	0.84
Europe	0.82
North America	0.68
Latin America	0.62
Asia	0.58
Middle East and North Africa	0.37

IV.   Discussion

A comparison of the evolution of labor productivities in construction and manufacturing is clearly important. The construction industry in Turkey has attracted a lot of attention in the last few years. Moreover, in the last few years and, at least according to the new GDP series, the share of the construction sector in total GDP has increased substantially. At the same time, the attention devoted to the construction industry has generated concerns that manufacturing may be neglected, and that the construction industry may not be an important source of long term productivity growth.

International comparisons presented in Tables 2 and 3 suggests that in terms of productivity in construction relative to manufacturing, Turkey looks like an outlier, especially given her level of income: Labor productivity in construction industries in countries with comparable levels of GDP in both Latin America and Asia are lower than that in manufacturing. Taking this information at face value, one interesting question this evidence raises is whether the Turkish case represents an especially well developed construction industry or a relatively stagnant productivity growth in manufacturing. Clearly answering this question requires more research and data.

We note that the comparisons above are done on the basis of current prices. Could differences in sectoral inflation provide part of the answer? To address this question, we first compare growth in real productivity in construction and manufacturing. Figure 2 shows that over the period 2005-2015 labor productivity growth in real terms has been positive in most years in both industries. Over the whole period, the average annual growth rate of real labor productivity in the construction sector is 2.76% and it is 3.5% in manufacturing. Note that productivity in the construction industry exhibits a large drop in the crisis year of 2009. If one were to exclude the period 2008-2010, average growth rate of real productivity in the in construction sector becomes 6.08% while it is 5.14% in manufacturing. In any case, according to the new GDP series nominal

productivity growth in the construction sector does not seem to be purely driven by increased prices.

Figure 2. Real Labor Productivity Growth (annual, %, with new series)
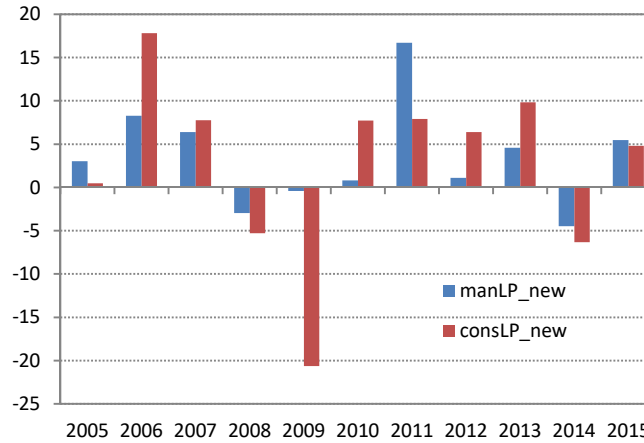

Note: manLP_new: annual rate of growth in real labor productivity in manufacturing as calculated from the new GDP series; consLP_new: annual rate of growth in real labor productivity in construction as calculated from the new GDP series

To gain further insight, Figure 3 provides implicit sectoral deflators for construction and manufacturing as well as the overall GDP deflator on the basis of the new GDP series with 1998 as the base year.[4] Over the last two decades prices in both industries rose less rapidly than overall inflation, as captured by the GDP deflator. However, price increases in construction were overall higher than in manufacturing. Figure 4 shows sectoral deflators relative to the GDP deflator, both under the new series (on the left), and, for purposes of comparison, under the old series (on the right). The figure on the left shows that relative to the GDP deflator, prices in manufacturing declined persistently until 2010 and increased slightly thereafter. By contrast, the decline in the price index for the construction (relative to the GDP deflator) industry stopped in the early 2000s, and actually increased substantially after 2010. Relative price movements are similar under the old series except that the post-2010 rebound in the deflator for the construction industry is weaker. Hence at least relative to manufacturing, there does seem to be a price surge in construction. A possible correction in prices in the construction industry could create some degree of realignment in the nominal labor productivities of the two industries.

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[4]Implicit sectoral deflators are derived as sectoral GDP in current prices divided by sectoral GDP in chain linked volume.

However, this fails to explain the differences between the GDP series on the one hand, and evidence presented from micro data, since in Table 1 both are calculated from current prices. In principle the two should be closely related but obviously they are not. There could be several sources of measurement error, in both components of labor productivity as measured in this note: Value added in the construction industry is especially difficult to measure. Informal employment in the construction industry is likely to be more extensive than in manufacturing, and the household labor surveys, which in principle do cover informal employment, may be underrepresenting the degree of informality in construction, at least more than in manufacturing. In any case, though, the discrepancy is substantial. Moreover, the two pieces of data tell radically different stories.

*Figure 3. Price Indices (GDP deflators with new GDP series, 1998=1)*
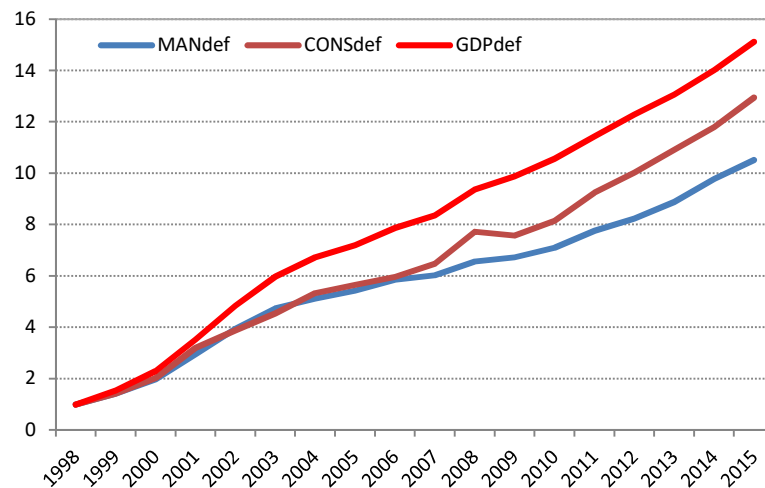
Note: MANdef: Implicit deflator for manufacturing; CONSdef: Implicit GDP deflator for construction; GDPdef: GDP deflator

Figure 4. Price Index Ratios (1998=1)

... under new GDP series

... under old GDP series
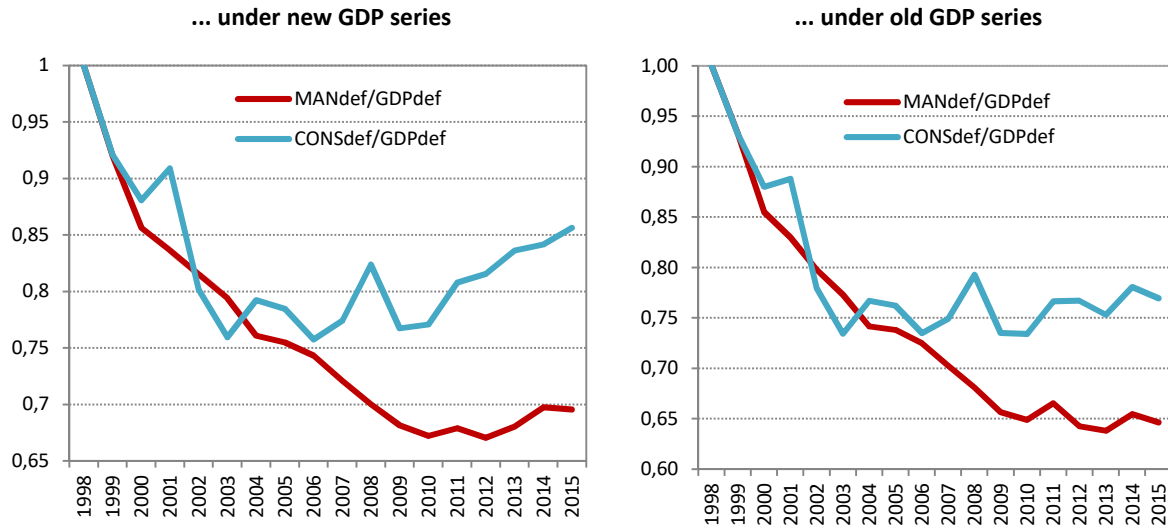
Some amount of discrepancy between labor productivity calculated from GDP series on the one hand and from micro data on the other is not surprising. One may still wonder about whether it is the manufacturing or construction industry that is more responsible for the macro-micro anomaly described above. Some evidence is provided in Figure 5. The figure shows the evolution of labor productivity in current prices as calculated from the new GDP series, old GDP series and from the AISS, for the construction industry (left panel) and the manufacturing industry (right panel). The figure shows that for the construction industry, nominal labor productivity calculated from micro data shows an almost stagnant trend after 2010, while trend from both the old and the new GDP series show an upward trend. By contrast, for the manufacturing industry, productivity from all three sources shows a similar upward trend, even though the levels are somewhat different. Hence evidence suggests that the anomaly in the micro data originates from the construction industry.

Figure 5. Labor productivity in construction and manufacturing (current prices)
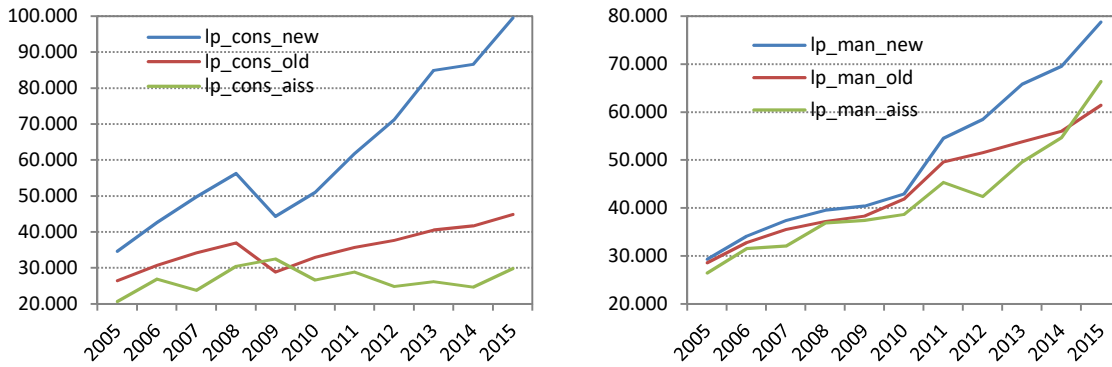
V. Conclusion

In this note we try to draw some attention to difficulties one faces when one attempts to compare labor productivity in the manufacturing and construction industries in Turkey. Under the new GDP series, labor productivity in current prices in manufacturing is lower than that in construction. We show that in comparison to countries with similar levels of per capita, Turkey looks like an outlier. Only in Sub-Saharan Africa the construction sector is more productive than the manufacturing sector. We also show that another important source of data, namely the Annual Industry and Service Statistics, fails to resolve the puzzle: labor productivity in construction in current prices calculated from this source falls significantly behind those calculated from either the old or new GDP series.