

Notlar | Briefs

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What happened to the sophistication of Turkey's exports?

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Özet:

Bir ülkenin ihracatının gelişmişlik düzeyini ölçen popüler göstergelerden biri, ihracat sepetindeki ürünlerin “ortalama gelir seviyesini” veya “verimliliğini” ölçen “İhracat Gelişmişlik Endeksi” veya “EXPY” endeksidir. Bir ülkenin EXPY endeksi ne kadar yüksekse o ülkenin ihracat sepeti o kadar zengin ülkelerinkine benzer.

Bu notta sunulan verilere göre Türkiye EXPY endeksi, 2002 ve 2007 yılları arasında görece hızlı bir yükseliş döneminin ardından, 2008-2015 yılları arasında duraklamıştır. Notta, son yıllarda Türkiye'nin ihracatının bölgesel dağılımındaki değişimin, yani Ortadoğu ve Kuzey Afrika (MENA) bölgesinin payındaki artış ile Avrupa ve Kuzey Amerika (ENA) bölgesinin payındaki düşüşün bu durumu açıklayıp açıklamadığı incelenmiştir. Türkiye'nin EXPY endeksinin 2002 ve 2007 yılları arasında görece hızlı artmasının ardında önemli ölçüde ENA bölgesine yapılan ihracatın EXPY endeksinin yükselmesi bulunmaktadır. Buna karşılık bu endeks 2008'den sonra hemen hemen sabit kalmıştır. MENA bölgesine yapılan ihracatın EXPY endeksi ise baştan daha yüksek gerçekleşmiştir ve çok fazla oynaklık göstermemiştir. Bölgelerin toplam ihracat içindeki paylarındaki değişim kendi içinde oldukça önemli olduğu halde, Türkiye'nin ihracatının gelişmişlik düzeyindeki değişimlerinde önemli bir rol oynamamış gözükmektedir.

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Abstract:

One popular indicator of the quality of a country's exports is the so-called "export sophistication index", or EXPY, which measures the "average income" or "productivity" of the products in a country's export basket. The higher is a country's EXPY, the more a country's export basket looks like that of a rich country.

Evidence presented in this brief shows that after a period of rapid increase between 2002-2007, the growth rate of Turkey's EXPY has slowed down in the period 2008-2015. We inquire whether the changes in Turkey's export destinations over the last few years, namely the increase in the share of Middle East and North Africa (MENA) countries at the expense of countries in Europe and North America (ENA) provide an explanation. We find that the relatively rapid increase in Turkey's EXPY in the 2002-2007 period is associated with an increase in the EXPY to ENA; EXPY to ENA remains almost constant after 2008. It turns out that EXPY of exports to MENA was relatively higher to start with and has remained relatively stable over time. Changes in regions' shares in exports, though quite significant in themselves, seem to have played a minor role in the relatively rapid increase and consequent slowdown of the overall sophistication of Turkey's exports.

Introduction

EXPY, widely known as the “export sophistication index” and constructed by Hausmann et al. (2007), shows the “average income level of a country’s exports” and has been shown to predict subsequent economic growth. Intuitively, it shows to what extent a country’s export basket looks like that of a rich country. Despite some drawbacks mentioned in the literature,³ the measure is still helpful to have an idea of an important aspect of the quality of a country’s export basket. PRODY, which is used in the calculation of EXPY, is a measure of sophistication for each product (Reis and Farole (2012)), reflecting the average income level of the countries that export this product. EXPY is the weighted average of the PRODY’s of the export products of a country.

After a period of relatively high growth, Turkey’s export sophistication as measured by EXPY slowed down after 2007. This note investigates this slowdown, using data from Penn World Tables and UN Comtrade databases for the period between 2002 and 2015. Although there might be several underlying reasons for the recent slowdown in Turkey’s EXPY, this note focuses on whether the change in export destinations has played a role.

A simple decomposition of the change in overall EXPY shows that an important factor that explains the evolution of Turkey’s EXPY is the change in region-specific EXPY values, and that the changes in the regions’ shares plays a comparatively more minor role. Specifically, the note shows that the sophistication of Turkey’s exports to the U.S.A, Europe, Canada, Australia and New Zealand increased substantially between 2002 and 2007 and remained stable afterwards. In the meantime, the share of these countries in Turkey’s exports decreased while that of the Middle East and North African countries (MENA) increased. The average EXPY of exports to MENA was relatively high to begin with, and remained stable over the whole period. After 2007, regional measures of EXPY remained almost constant, explaining the relative stagnancy of EXPY in the 2008-2015 period.⁴

Data

The two main sources of data used in this note are the Penn World Tables (PWT) for per capita GDP and the UN Comtrade for exports. In the calculation of per capita GDP, real GDP (RGDPo,

³ For example, it does not take into account the variations in unit values of exported goods across countries, which is an indicator of the relative quality of the product against international competitors, as discussed, for example, by Xu (2010).

⁴ The structural shift in Turkey’s export destinations has been emphasized in the literature, including by Cebeci and Fernandes (2015). Cebeci (2014) showed that exporting to high-income destinations results in higher firm productivity, while exporting to low-income countries does not.

Output-side real GDP at chained PPPs) and population data from PWT version 9.0 are used. UN Comtrade 6-digit HS2002 data is used for exports at the product level.

Calculation of PRODY and EXPY

We follow Hausmann et al. (2007) to calculate PRODY and EXPY. Average PRODY (that shows the productivity level) of each exported product is calculated as the mean value of annual PRODY levels between 2002 and 2005. PRODY measures are constructed for a consistent sample of countries which report trade data in each of the years 2002 to 2005:

$$PRODY_{kt} = \sum_j \frac{x_{jkt}/X_{jt}}{\sum_j x_{jkt}/X_{jt}} * Y_{jt} .$$

where x_{jkt} is the export value of country j in product k in year t ; X_{jt} is the total export value of country j in year t ($\sum_k x_{jkt}$) and Y_{jt} is the per capita GDP of country j in year t .

Average PRODY values for each product k are calculated as follows:

$$PRODY_k = \sum_{t=2002}^{2005} PRODY_{kt} / 4$$

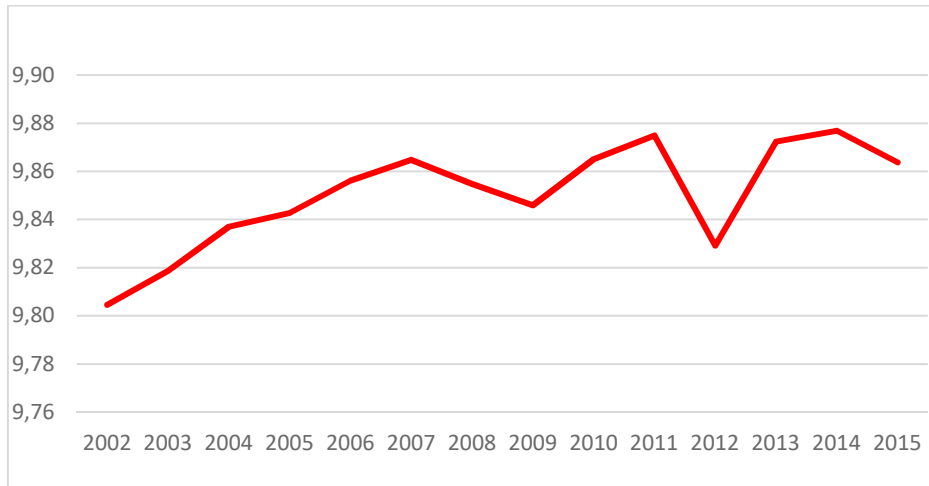
EXPY value of Turkey in year t ($EXPY_{TUR,t}$) is then calculated as the weighted average of PRODY values of products exported by Turkey, where the weights are the value shares of these products in Turkey's total exports in that year.

$$EXPY_{TUR,t} = \sum_k \frac{x_{TUR,kt}}{X_{TUR,t}} * PRODY_k$$

Basic observations on Turkey's EXPY across years

Logarithm of EXPY values of Turkey between 2002 and 2015 are shown in Figure 1. The figure shows that Turkey's EXPY increased substantially between 2002-2007. After 2007, the increase in EXPY slowed down. While EXPY increased by an average of approximately 1.21 percentage points between 2002 and 2007, it increased by an average of only 0.02 percentage points between 2008 and 2015.

Figure 1: Log EXPY of Turkey between 2002 and 2015



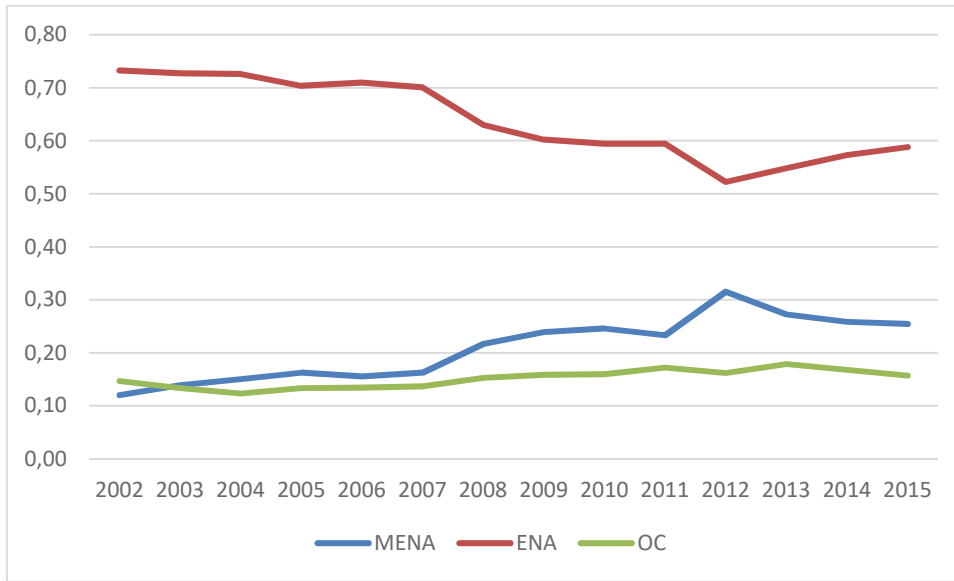
Since the PRODY values of individual products are constant over the period, this decrease can only be explained by the product composition of Turkey's export basket. One possible cut into the problem is to investigate changes in the shares and degree of export sophistication of different export destinations.

We group Turkey's export destinations into three groups: ENA (which includes Europe and North America)⁵, Middle East and North Africa (MENA)⁶ and other countries (OC). Figure 2 shows the evolution of the share in total exports of these three groups. As shown in the figure, the share of ENA countries in total exports declined from about 72 percent in 2002 to about 60 percent in 2011 and remained relatively stable afterwards (except for a drop in 2012 and recovery afterwards). By contrast, the share of MENA countries increased from about 12 percent in 2002 to 16 percent in 2007 and 25 percent in 2015. The share of OC remained constant at about 15 percent throughout the period.

⁵ **Countries included in ENA region:** USA, Canada, UK, Australia, New Zealand, Belarus, Bulgaria, Czechia, Hungary, Poland Rep. of Moldova, Romania, Russian Federation, Slovakia, Ukraine, Albania, Andorra, Bosnia Herzegovina, Croatia, Estonia, Finland, Gibraltar, Greece, Holy See (Vatican City State), Ireland, Italy, Latvia, Lithuania, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, Spain, TFYR of Macedonia, Austria, Belgium, France, Germany, Luxembourg, Netherlands, Switzerland, Sweden, Norway, Denmark.

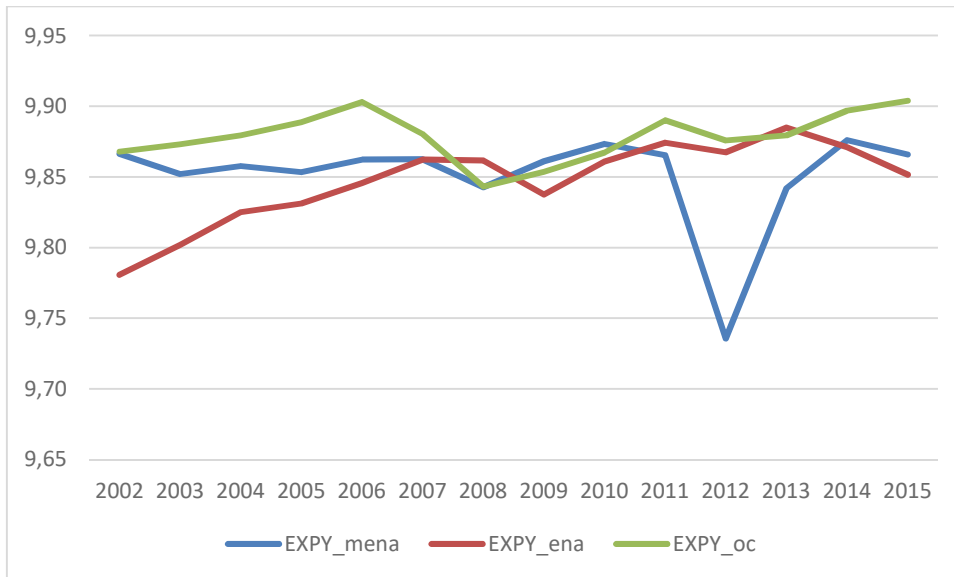
⁶ **Countries included in MENA region:** Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen.

Figure 2: Share of Turkey's exports to MENA, ENA and other countries between 2002 and 2015



We next calculate the sophistication of exports for the three regions. Basically, we calculate the weighted average of PRODY as before, but now the weights are the share of each product in total exports to that region. Values for $EXPY_{MENA}$, $EXPY_{ENA}$ and $EXPY_{OC}$ are presented in Figure 3.

Figure 3: Log $EXPY_{MENA}$ Log $EXPY_{ENA}$ and Log $EXPY_{OC}$ of Turkey between 2002 and 2015



One can make several observations: $EXPY_{ENA}$ is strictly increasing until 2007 (with an average increase of 1.6 percentage points each year), but remains relatively stable after 2007. On the other hand, $EXPY_{MENA}$ was higher to start with, and remains stable within a narrow band throughout

the period, except for a sharp dip (and consequent quick recovery) in 2012.⁷ $EXPY_{OC}$ does not show big changes across years either.

Decomposing changes in regional EXPY

Overall EXPY is an average of the regional EXPYs, weighted by the regional export shares. To investigate the change in overall EXPY of Turkey further, we use the following decomposition formula:

$$\Delta EXPY_t = \sum_i s_{i,t-k} \Delta EXPY_{i,t} + \sum_i EXPY_t \Delta s_{i,t} ,$$

where $\Delta EXPY_t$ is the change in Turkey's EXPY between years $t - k$ and t . s stands for export shares and i stands for regions. The first component on the right hand side (the "within component") shows how much of the change in overall EXPY comes from changes in the regional EXPY values, weighted by the beginning of period export shares. The second component (the "between component") shows the contribution of changes in the export shares of the regions, weighted by the (end of period) regional EXPY values.

Table 1: Decomposition of the change in Turkey's overall EXPY (percentage points)

	2002 - 2007	2007 - 2015
Within Component	6.10	0.80
<i>MENA</i>	-0.05	0.50
<i>ENA</i>	5.97	-0.63
<i>OC</i>	0.19	0.93
Between Component	-0.02	0.08
<i>MENA</i>	41.79	37.21
<i>ENA</i>	-31.43	-41.37
<i>OC</i>	-10.38	4.24
Total Change	6.09	0.88

The decomposition of the change in Turkey's overall EXPY for the two periods is shown in Table 1. The term "total change" refers to the change in percentage points in log EXPY over the whole period. The rest of the entries are contributions of the regional within and between elements, again expressed in percentage points. In both periods, the contribution of the within component is almost a hundred percent of total change. In other words, the change in regional EXPY values – rather than their export shares – is dominant in explaining the overall change in EXPY. In the first period, almost all of the change in the within component is due to the increase

⁷ The sharp drop in the MENA-EXPY in 2012 seems to be due to a sharp and temporary increase in gold exports. The PRODY for gold exports is quite low. Share of gold export to this region rises to 23% in 2012 from 1% in 2011. It may also be the reason for the sudden and temporary decrease in Turkey's overall EXPY in 2012 (shown in Figure 1.)

in $EXPY_{ENA}$. In the second period, the within component is much smaller but still larger than the between component.

The basic decomposition supports the idea that the increase in Turkey's $EXPY$ in the first period is primarily due to the increase in $EXPY_{ENA}$. In order to see whether there is a specific product group that drives this change, we have created 5 productivity groups for the exported products according to their $PRODY$ values. The $PRODY$ values and the number of products included in each group are shown in Table 2.

Table 2: $PRODY$ values and number of products in each productivity group (2002-2015)

Productivity Level Group	$PRODY$ value	Number of products exported to MENA	Number of products exported to ENA
1	0 – 10.000	308	312
2	10.000 – 20.000	1.534	1.555
3	20.000 – 30.000	2.345	2.363
4	30.000 – 40.000	656	663
5	40.000 or more	44	47

Figure 4 (5) shows the share of total export value of the products exported to MENA (ENA) in each productivity level group across years. The productivity level of the exported products to MENA remains almost the same across years (except for the anomaly in 2012.) The highest share (almost 50-60 percent of total exports to that region) belongs to the 2nd product group. Similarly, the 2nd product group has the highest share in exports to ENA as well. However, in the case of ENA, the share of the 3rd group of products rises from 29% in 2002 to 40% in 2007 and remains almost constant afterwards while that of the 2nd group decreases from about 68 to 48 percent in the same period. A further look at the product shares shows that half of the increase in the share of the 3rd group in 2002-2007 comes from the increase in the share of vehicles⁸ exported to ENA. Its share in total exports to ENA was 6% in 2002, and increases to %12 in 2007. After 2007, the share of vehicles also remains almost constant. In addition to some types of motor vehicles, washing machines and dish washing machines are other examples of products in the 3rd productivity level group.⁹

⁸ This product group is defined as "Vehicles other than railway or tramway rolling stock, and parts and accessories thereof."

⁹ We also note the (worrying) increase in the share of group 1 - low $PRODY$ - products in 2014 and 2015 towards both ENA and MENA. We think it is too early to decide on whether this is a new trend or just a temporary shock.

Figure 4: Share of total export value of the products exported to MENA between 2002 and 2015

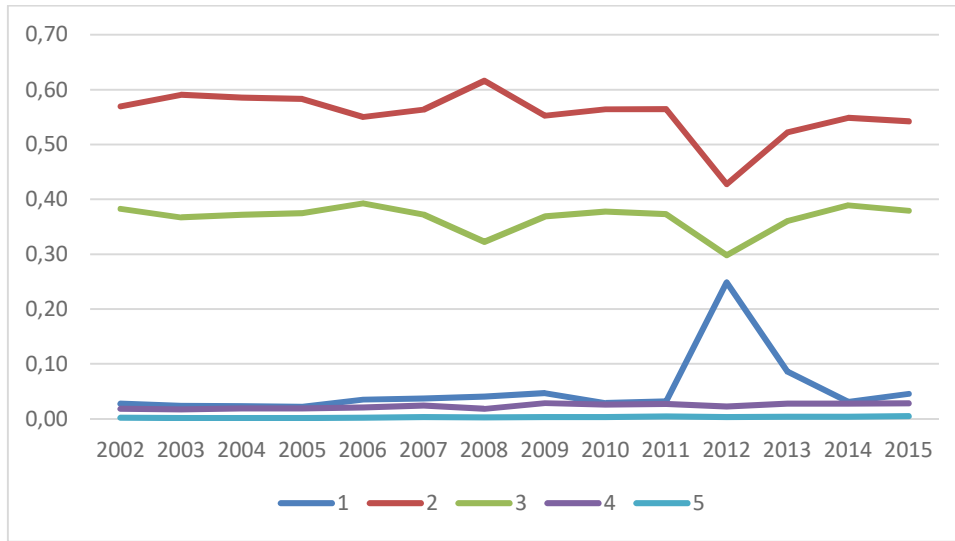
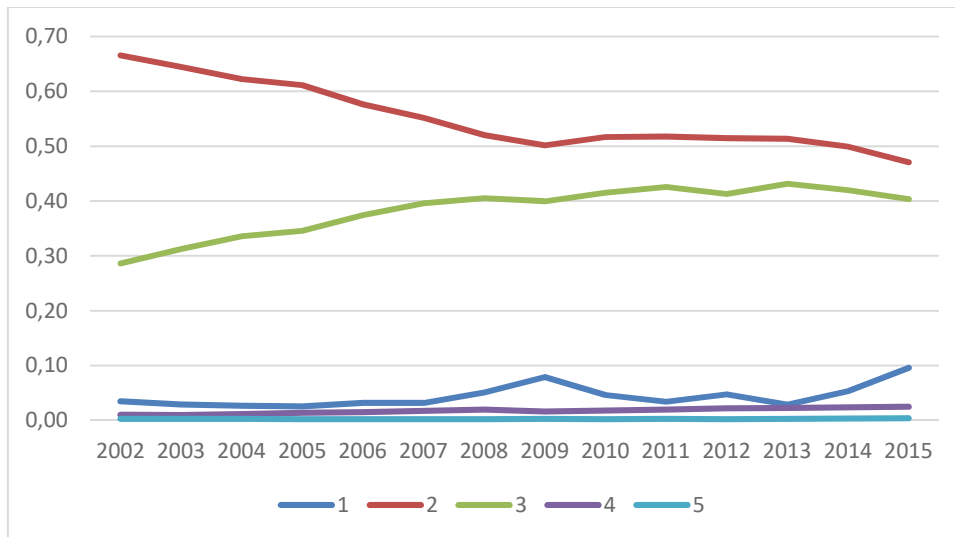


Figure 5: Share of total export value of the products exported to ENA between 2002 and 2015



We have also checked whether the increase in the sophistication of exports to ENA is because of the introduction of new products. On average, only 2% (5%) of the value of products exported to ENA (MENA) comes from products other than those that have been consistently exported since 2002. So new products play a very minor role.

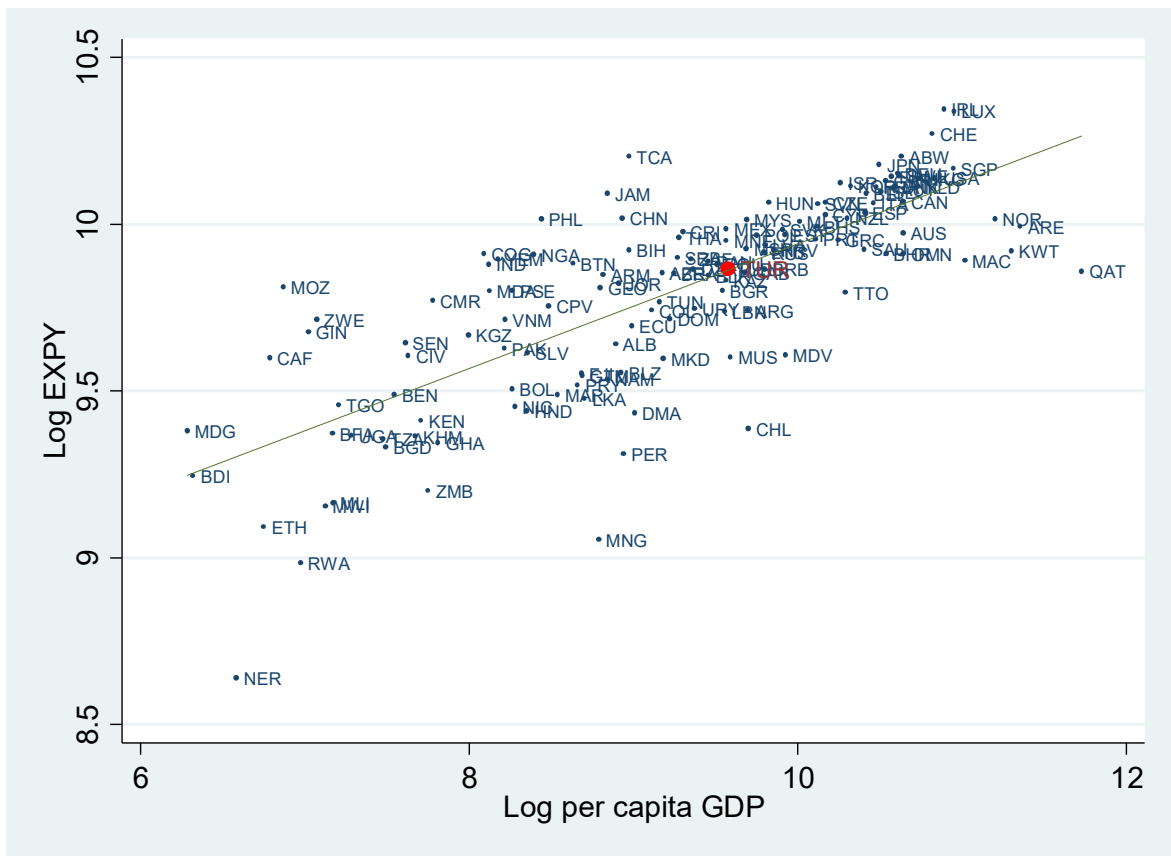
Is Turkey falling behind in the sophistication of her exports?

Is the recent slowdown in the increase of EXPY a sign that Turkey is falling behind in the sophistication of her exports relative to other countries? A simple way to address this question is to examine the global relation between per capita GDP and EXPY and identify Turkey's

position in that relation. In other words, we ask whether Turkey's EXPY is above or below world averages given its level of per capita GDP.

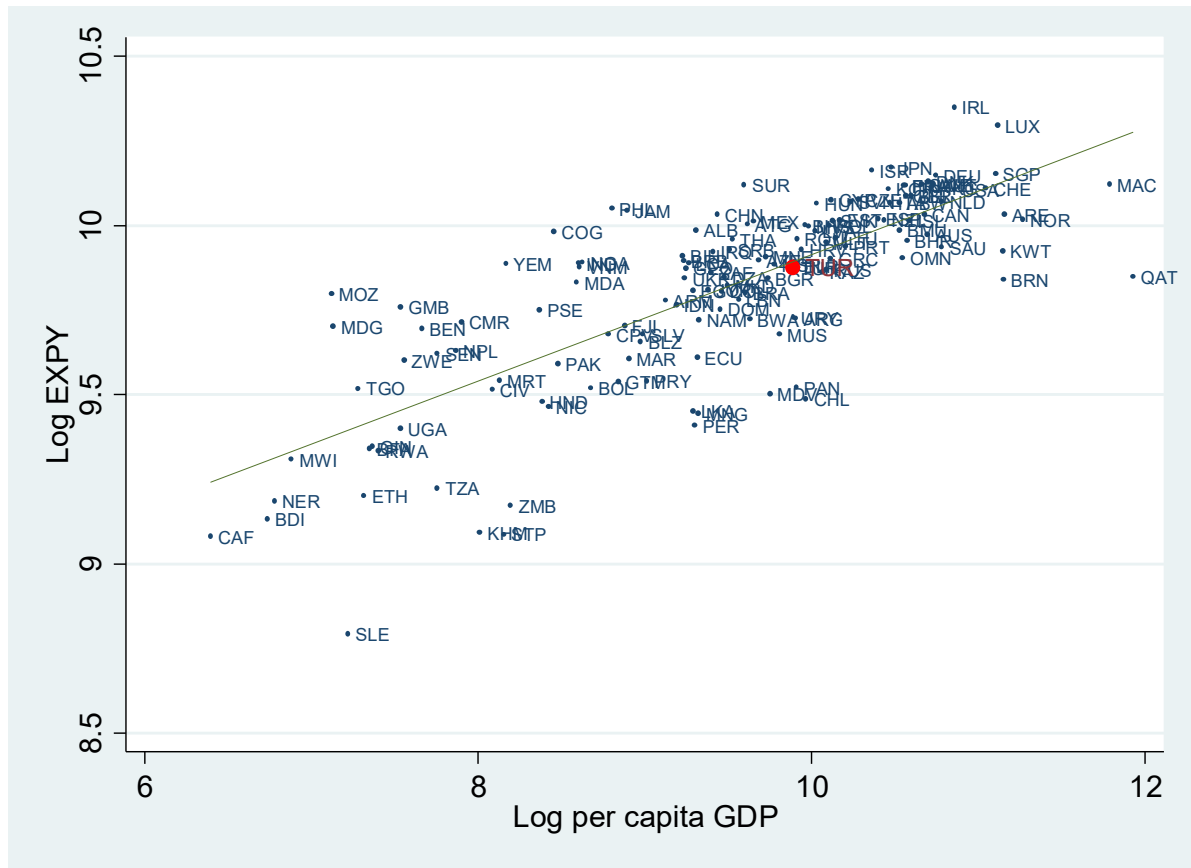
Figures 8 and 9 show the fitted lines obtained from cross-country regressions of log EXPY on log GDP per capita in 2007 and 2014, respectively. Turkey, labeled in red, is approximately on the fitted line in both years. We conclude that despite the slowdown, Turkey's EXPY position has not changed much relative to other countries, and has remained at the level that one would expect on the basis of Turkey's per capita GDP. On the one hand, this may be taken as good news. On the other hand, it shows that Turkey has not been able to generate a jump in the sophistication of her exports over the last decade or so.¹⁰

Figure 8: EXPY - per capita GDP (2007)



¹⁰ Actually, it seems that Turkey's relative position has not changed since 2002: A similar exercise carried out for the year 2002 finds Turkey on the fitted line as well.

Figure 9: EXPY - per capita GDP (2014)



Conclusion

After a period of relatively rapid growth between 2002-2007, the rate of growth in the degree of sophistication of Turkey's exports has slowed down since 2008. We find that the rapid increase in 2002-2007 is closely associated with the increase in the sophistication of exports to Europe, North America, New Zealand and Australia, a group of countries labelled ENA in this note. In turn, this increase is closely associated with the increase in the share of "relatively high productivity" products like motor vehicles. The degree of sophistication of exports to the Middle East and North African countries was higher (relative to ENA) to begin with, and has remained relatively stable throughout the 2002-2015 period. The reorientation of Turkey's exports towards MENA countries seems to have played a relatively minor role in the relative slowdown of EXPY in the last few years. Prior to 2007, the ENA market was associated with an increase in the sophistication of Turkey's exports to that region. This no longer seems to be the case.

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