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Do researchers pay attention to publication subsidies?

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ABSTRACT

The Scientific and Technological Research Council of Turkey (Tubitak) gives individual researchers subsidies for their publications. Researchers freely use these publication subsidies as pocket money. The publication subsidy given to a researcher for an article is inversely proportional to the number of authors of the article. That is, a researcher who publishes an article receives X/N Turkish Lira (TL), where X is the subsidy amount assigned to the journal in which the article is published and N is the number of authors. In this paper, we use the 250 TL rule to see whether publication subsidies affect the behavior of researchers. The rule states that no subsidy is given to any of the authors of an article if X/N is smaller than 250 TL. We use this discontinuity to provide evidence that Turkish researchers limit their number of co-authors in order to receive publication subsidies.

1. Introduction

The Scientific and Technological Research Council of Turkey (Tubitak) is a public institution established in 1963 to promote academic and industrial research in Turkey.[1] Tubitak started to distribute publication subsidies to individual researchers in 1993.[2] A subsidy is given to all Turkish-addressed publications regardless of the type of institution to which a researcher is affiliated. The subsidy is awarded only to publications that are indexed in the Web of Science Core Collection and that are of the document type "article".[3]

Tubitak assigns each journal a subsidy amount by using the Article Influence Score rankings within the subject categories that are created by Tubitak.[4] Then, the subsidy amount is divided by the number of authors in the article so each author gets a fraction of the subsidy amount. For example, if 1500 Turkish Lira (TL) is assigned to a journal, then each author gets 500 TL in the case of a three-author article in this journal.

The subsidy amount is relatively high for publications in journals with the highest Article Influence Score rankings within Tubitak's subject categories. However, the average researcher receives only a modest amount. According to the Tubitak

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[1] http://www.tubitak.gov.tr/tr/kurumsal/hakkimizda/icerik-biz-kimiz (in Turkish)

[2] http://cabim.ulakbim.gov.tr/ubyt/ubyt-hakkinda/(in Turkish)

[3] http://www.tubitak.gov.tr/sites/default/files/237bk-ek1_0.pdf (in Turkish). Review articles are also awarded but the rules are different. Since there are very few review articles, we exclude them from our study. Proceedings articles, letters, editorials and other document types are not awarded any subsidy.

[4] The publication subsidy formula is given in http://www.tubitak.gov.tr/sites/default/files/237bk-ek1_0.pdf (in Turkish) and will be explained in Section 4 of this article. The publication subsidy amounts are given in http://ulakbim.tubitak.gov.tr/sites/images/Ulakbim/ubyt_2015_dergi_listesi.xlsx. Unfortunately, one cannot compute the publication subsidy amounts by using the publication formula and bibliometric indicators because Tubitak does not disclose its subject categories. Tubitak simply states that it aggregates Web of Science categories to have a statistically meaningful number of journals within each category.

http://dx.doi.org/10.1016/j.joi.2017.02.010
1751-1577/

Report, 12,500 researchers were awarded a total of 11.5 million TL publication subsidies in 2014.[5] Therefore, an average researcher gets 920 TL, which is only a quarter of the monthly wage of an associate professor in a public university. A researcher who publishes a solo-authored Nature article is awarded 5000 TL in the same year.

Although the subsidies are direct rewards for publications, it is not obvious that they are effective in changing the behavior of researchers. First, the publication subsidies are relatively small on average so they may not be enough to motivate researchers to be more productive. Researchers may prefer to teach overtime or provide consulting services to private companies to get higher monetary rewards. Second, the publication subsidies are pocket money rewards. Consequently, they are different than research project rewards which enable researchers to get laboratory equipment or hire assistants that have direct effects on productivity.

In this paper, we test whether researchers pay attention to one peculiar publication subsidy rule. The 250 TL rule states that no subsidy is given to an article if the per author reward falls below 250 TL. For example, if a journal is assigned a subsidy amount 1000 TL, then each author gets 250 TL in the case of a four-author article but they do not get any subsidies in the case of a five-author article in that journal.

Tubitak does not specify the reason for the 250 TL rule. We are sure that the aim is not to limit the extent of collaboration among researchers. However, researchers will limit the number of authors in a paper if they care about the 250 TL rule. Therefore, the 250 TL rule may have an unintended effect of decreasing collaboration among researchers.

A possible reason for the 250 TL rule may be to achieve interfield equality. Hicks, Wouters, Waltman, de Rijcke, and Rafols (2015) note that interfield equality is a major concern for research evaluation. In a preceding paper (Yuret, 2016), we show that chemists get 4.30 times more subsidy than economists whereas chemists would get 4.62 more subsidy than economists in the absence of the 250 TL rule.

We do not directly test whether the publication subsidies improve productivity but we test whether researchers change their co-authorship patterns to get publication subsidies. If the authors take publication subsidies into account by changing the number of authors in the paper, they would also pay attention to publication subsidies when they decide whether to produce more papers.

There are many other factors than publication subsidies that affect the productivity of researchers, such as the academic promotion rules and the ever-changing human capital base. Therefore, the effect of the relatively small publication subsidies on productivity is likely to be overshadowed by these factors. However, the effect of the 250 TL rule on co-authorship patterns is not likely to be overshadowed. Neither the academic promotion rules nor the changing human capital base are likely to decrease the average number of authors in papers.

2. Related research

Performance-based university research funding systems have been implemented in many countries. Hicks (2012) lays out the properties of the research funding systems in Australia, Hong Kong and 12 European countries. She concludes that these funding systems aim for excellence in research. In other words, the objective is to increase the scientific output both in quantity and quality. Franzoni, Scellator, and Stephan (2011) state that eleven countries out of the thirty in their sample have started a new incentives program for publication performance between 2000 and 2009. They note that China and Korea introduced a program like Turkey which includes cash bonuses to individual researchers.

There are articles closely related to this study which also analyze the unintended effects of publication subsidies. Butler (2003) shows that the quantity of publications has increased but the quality of the publications has decreased in Australia. She attributes this outcome to the fact that the Australian research subsidies give more weight to the total publication count. Hicks (2012) notes that Australia has updated its system to increase high-quality publications. Australia stratified the journals into quality tiers and gave more weight to higher-quality journals. Moed (2008) shows that productivity in terms of the quality of publications has improved in the United Kingdom after research policy had switched to reward high-quality publications.

Aagaard, Bloch, and Schneider (2015) analyze the Norwegian publication incentives, which also groups journals into tiers. They find that the quality of publications has not decreased after the publication incentives had been implemented. Bloch and Schneider (2016) also analyze the Norwegian system. They follow the same researchers before and after implementation of the publication incentives, and they show that the quality of publications has improved for professors, associate professors and PhDs.

Heywood, Wei, and Ye (2011) analyze the effect of cash bonus incentives on publication productivity. They study the dramatic five-fold increase in the per paper publication subsidy in Southwest University of Finance and Economics, which is a major university in China. They note that a single publication can double the annual earnings of professors under the new publication subsidy rates. They show that publication performance has increased around fifty percent because of the increase in the subsidies.

There are studies which analyze the relationship between research policies and publication performance in different countries. Auranen and Nieminen (2010) analyze the research subsidy systems of eight advanced countries. They classify

[5] Available from www.tubitak.gov.tr/sites/default/files/tubitak_2014_faaliyet_raporu.pdf (in Turkish).

research policy in terms of competitiveness. They define the efficiency of a policy as the number of publications per unit of R&D funding in higher education. They show that there is no relationship between efficiency and competitiveness of research policy. Leydesdorff and Wagner (2009) and Lin, Chen, and Yang (2014) show that the countries which have higher R&D funds have more publications.

Another group of studies compare researchers who are slightly above a threshold to get a research project to researchers who are slightly below the threshold. They study the effect of getting the research project on researcher productivity. Jacob and Lefgren (2011a, 2011b) analyze the effect of research funding distributed by the National Institute of Health in the United States. In their first study, they find that postdoctoral research funds improve the productivity of researchers by 20%, whereas in their second study they find that research project funding improves the productivity of researchers by 7%. Benavente, Crespi, Garone, and Maffioli (2012), Chudnovsky, Lopez, Rossi, and Ubfal (2008) and Fedderke and Goldschmidt (2015) find a significantly positive but modest increase in the productivity of researchers who get research projects in Chile, Argentina and South Africa respectively.

3. Data

Tubitak gives publication subsidies only to the articles indexed in the Web of Science Core Collection. The publication subsidy formula is given in Tubitak's web site.[6] Unfortunately Tubitak does not give the publication subsidy formula for the years prior to 2014. The publication subsidy amount assigned to each journal is also available from Tubitak's web site.[7] The essentials of the publication subsidy formula will be given in the next section.

Only article publications but not other type of publications are considered because the publication subsidy is only given to articles. The Web of Science lists address information of all of the authors in an article. We download all the articles which have Turkish addresses in 2014 and 2015 from the Web of Science. We determine whether the publication is from a university, hospital or public research institute by analyzing the addresses of the authors. We download all the Turkish-addressed articles in six Web of Science categories from 1990 to 2015 for our longitudinal study.

We test whether the researchers in Turkey pay any attention to publication subsidies by making an international comparison. Although the publication subsidies are given to authors who have Turkish addresses, the articles which do not have any Turkish addresses are also considered for comparison. 30 is used as the cut-off.[8] That is, the journals which have at least 30 articles from Turkey and at least 30 articles from the foreign country in comparison are considered. Then, the percentage of Turkish-addressed articles that receive subsidy are compared to that of the foreign-addressed articles in each of these journals. We only consider the 25 countries that we can do the binary comparison for at least 30 journals.[9]

4. Tubitak formulation

The publication subsidy formulation has five steps.

Step 1. Tubitak creates its own subject categories by aggregating the Web of Science subject categories. The subject categories are not disclosed by Tubitak. Unfortunately, one cannot connect the subsidy amounts to the bibliometric indicators without knowing the subject categories. However, it is not a problem because we only use the publication subsidy amounts in our analysis which is provided by Tubitak (see Step 4).

Step 2. Tubitak ranks each journal according to its Article Influence Score (AIS) within its subject category.

Step 3. Tubitak computes an Effect Score (ES) as follows. First, Tubitak computes the mean and standard deviation of the AIS for all the subject categories. A journal that has a higher AIS than the mean plus two standard deviations gets 100 ES whereas a journal which has lower AIS than the mean minus two standard deviations gets 0 ES. ES to all other journals are linearly assigned according to their rankings within their subject categories. This step effectively smooths the subsidies given to outliers

Step 4. The subsidy amount to each journal is computed as:

$$\text{Subsidy} = 500 + A * (ES/100)^{2.5}$$

where A is 4500 TL in 2014 and is 7000 TL in 2015. That is, the maximum subsidy amount has increased from 5000 in 2014 to 7500 in 2015. The publication subsidy amount for each journal is given by Tubitak.[10]

Since ES/100 is in-between 0 and 1, raising it to the power of 2.5 effectively makes most journals get a subsidy amount close to the minimum amount (500 TL) rather than the maximum amount (5000 or 7500 TL). We see this fact by listing the journals by their subsidy amounts in Table 1. We see that more than half of the journals are assigned subsidy amounts less than 1000 TL and more than 70% of the journals are assigned subsidy amounts less than 1500 TL in both 2014 and 2015.

Step 5. Three additional rules are applied at this stage.

[6] http://www.tubitak.gov.tr/sites/default/files/237bk-ek1_0.pdf (in Turkish).
[7] http://ulakbim.tubitak.gov.tr/sites/images/Ulakbim/ubyt_2015_dergi_listesi.xlsx (in Turkish).
[8] We use a cut-off because we do not want to use too few articles and to few journals to do our comparison. Our choice of 30 is ad-hoc.
[9] The list of journals is available from https://sites.google.com/site/tolgayuret/home/filestorage/list298journals.xlsx
[10] http://ulakbim.tubitak.gov.tr/sites/images/Ulakbim/ubyt_2015_dergi_listesi.xlsx (in Turkish)

Table 1
Number of Journals in Subsidy Intervals.

Subsidy (TL)	Number		Percentage	
	2014	2015	2014	2015
7500		765		6.2
(5000–7500)		374		3.0
5000	738		6.0	
[3500–5000)	448	465	3.7	3.8
[2500–3500)	671	516	5.5	4.2
[1500–2500)	1549	1119	12.7	9.0
[1000–1500)	1766	1299	14.5	10.5
(500, 1000)	6379	7266	52.2	58.7
500	661	573	5.4	4.6
Total	12212	12377		

a) Fractional rule: The authors receive subsidies inversely proportional to the number of authors in the article. If Tubitak assigns 2000 TL to a journal in step 4 of the formulation then each author gets 400 TL in a five-author article in that journal.
b) 250 TL rule: If per author subsidy amount falls below 250 TL, then no subsidy is paid. If Tubitak assigns 2000 TL to a journal in step 4 of the formulation, then each author gets 250 TL in an eight-author article but gets no subsidy in a nine author article.

The 250 TL rule implies a threshold number of authors above which none of the authors get paid. The threshold number of authors is two for an article in a journal which is assigned a 500 TL subsidy because per author subsidy falls below 250 TL if the number of authors is more.

Although the subsidy is being paid only to the authors from Turkey, all the authors are considered for the 250 TL rule. For example, if there are two authors from Turkey in a four-author article in a journal with a subsidy amount of 1000 TL, then the authors from Turkey receives 250 TL each. If there are more than four authors in that article, the authors from Turkey cannot get any subsidies.

Abramo, D'Angelo, and Di Costa (2011) state that the research assessment policies in many countries change their rules frequently, and researchers have a hard time in adopting them. Moreover, they mention that the rule changes may be communicated to the researchers as late as the end of the evaluation period. Moreover, they claim that the rule changes make it hard to compute the impact of the policies even after two consecutive years.

The publication subsidy amounts change in Turkey frequently. From 2014 to 2015, threshold number of authors did not change for 6129 journals. The threshold number of authors have increased for 3564 journals and decreased for 2940 journals. Since Tubitak takes publication year into account, an article may receive subsidy if it is published in December 2014 but it may not receive any subsidy if it is published in January 2015.

c) 10 paper rule: Each researcher can get a subsidy up to 10 papers that she publishes in a given year. For example if she publishes 13 papers in a given year, then she should choose 10 papers to submit in order to get the publication subsidy.

In this paper, we choose not to consider this rule for two reasons. First, there are few researchers who publish more than ten papers. In Yuret (2016), we compare the subsidy earnings of chemists to economists in top Turkish Universities. The results are not affected much by the 10 paper rule because few researchers publish more than ten papers. Second, we have practical reasons. We know from Yuret (2016) that one has to check individual CVs because of name confusions in the Web of Science data. This paper has a much larger data-set. Foreign-addressed published articles are also used for comparison. Therefore, it is very difficult to check all the CVs of all the researchers in this data-set.

5. Percentage of articles that receive subsidy: domestic vs international collaboration

Table 2 analyzes the articles that have Turkish addresses in 2014 and 2015. The first column of Table 2 gives the threshold number of authors for articles.[11] The domestically produced articles which have all authors from Turkey are listed in the second to fourth column of Table 2. The internationally-collaborated articles which have authors both from Turkey and from other countries are listed in the fifth to seventh columns. The second and fifth columns give the number of articles which receive subsidy because the per author reward is above 250 TL, the third and sixth columns give the number of articles which do not receive subsidy because the per author reward falls below 250 TL. The fourth and seventh columns give the percentage of the articles that receive subsidy.

[11] Since the minimum publication subsidy amount for a journal is 500 TL., the minimum threshold number of authors is equal to two.

Table 2
Publication Subsidy: Domestic collaboration vs International collaboration.

Threshold # of Authors	Domestic collaboration			International collaboration		
	Subsidy	No Subsidy	Percentage of articles that receive subsidy	Subsidy	No Subsidy	Percentage of articles that receive subdidy
2	8626	19157	31.0	729	3926	15.7
3	2019	2184	48.0	478	1021	31.9
4	1536	895	63.2	405	517	43.9
5	1154	404	74.1	345	299	53.6
6	786	127	86.1	272	146	65.1
≥7	4485	79	98.3	2656	552	82.8
Total	18606	22846	44.9	4885	6461	43.1

Table 3
Publication subsidy by six Web of Science subject categories.

	Subsidy	No Subsidy	Percentage
Political Science	95	6	94.1
Mathematics	875	319	73.3
Economics	391	147	72.7
Physics, Particles & Fields	223	500	30.8
Surgery	579	1905	23.3
Medicine, Research & Experimental	104	962	9.8

Table 2 shows that the percentage of articles that receive subsidy increases as the threshold number of authors increases. For example, 31% of the articles that have a threshold of two authors get subsidies but 98.3% of the articles that have a threshold of seven or more authors get subsidies. The same relation holds for internationally-collaborated articles as well. The articles which have a threshold of a higher number of authors are more likely to receive subsidy because it is easier to satisfy a threshold of seven authors than a threshold of two authors.

The last row of Table 2 shows that more than half of the articles do not receive subsidy because of the 250 TL rule. The percentage of articles which receive subsidy is merely 44.9% of the domestically-produced articles and 43.1% for the internationally-collaborated articles. This outcome implies that the researchers do not give primary importance to research subsidies. If their main aim were to get publication subsidies, then they would not write more than half of their papers that were not eligible for any publication subsidies.

It is also observed from Table 2 that the percentage of internationally-collaborated papers that receive subsidy is less than that of domestic papers. For example, 31% of the domestically-produced papers receive subsidies when the threshold is two authors whereas the percentage is merely 15.7% for the internationally-collaborated articles. A chi-square test confirms that the percentage of articles that receive subsidy is significantly different for domestically-collaborated papers than for internationally-collaborated papers.[12] There are two possible explanations for this result. First, the authors from Turkey may not have the authority to restrain the number of authors to get the publication subsidy in an internationally-collaborated paper. Second, internationally-collaborated papers may naturally have more authors. For example, none of the articles that are collaborated by three countries would receive any subsidy when the subsidy amount for the journal is equal to 500 TL because the number of authors should be at least three.

The last observation of Table 2 is that the difference between the domestically-collaborated and internationally-collaborated papers is more pronounced when we condition on the threshold number of authors but less pronounced when we take all the articles together. The percentage difference between all domestically and all internationally-collaborated articles which receive subsidies is merely 1.8 percentage points (44.9% – 43.1%). But all the conditioned differences are above ten percentage points. For example, the difference between domestic and internationally-collaborated articles which have a threshold of three authors is 16.1 percentage points (48% – 31.9%). This outcome is due to the fact that the internationally-collaborated papers are published in higher-quality journals which have higher threshold number of authors. For example, 11.0% of the domestically-collaborated articles have a threshold of seven authors or more but 28.2% of the internationally-collaborated articles have a threshold of seven authors or more.[13]

Table 4
Publication subsidy: University vs. Other types of institutions.

	University			PRI		
	Paid	Unpaid	Percentage	Paid	Unpaid	Percentage
Economics	343	116	74.7	32	17	65.3

	University-PRI		
	Paid	Unpaid	Percentage
Economics	8	11	42.1

	University			Hospital		
	Paid	Unpaid	Percentage	Paid	Unpaid	Percentage
Medicine, R & E	67	452	12.9	12	87	12.1
Surgery	339	855	28.4	99	352	21.9

	University-Hospital		
	Paid	Unpaid	Percentage
Medicine, R & E	23	388	5.7
Surgery	119	604	16.4

6. Percentage of articles that receive subsidy: by field and institution

Table 3 lists the articles from six Web of Science subject categories. We see that the percentage of articles which receive subsidies is above 70% in political science, economics and mathematics whereas the percentage of articles is below 31% in particles physics, surgery and experimental medicine. The 250 TL rule is pretty restrictive in medical sciences that have large teams of researchers for projects. Social scientists can work in smaller groups so that they are not as adversely affected from the 250 TL rule.

In Table 4, we test whether the percentage of articles that receive subsidy vary by the type of institutions in which the authors work. We cannot do any comparison for mathematics, particle physics and political science because almost all the publications in these fields are from universities. Economics publications from universities are compared to those from public research institutes (PRI). Medical publications from universities are compared to those from hospitals. Publications that are from other types of institutions such as military academies are excluded.

The researchers from universities are more likely to receive payment for their publications than other types of institutions. 74.7% of the articles from universities received payment whereas the percentage is 65.3 for PRI. Although, medical researchers from universities are more likely to receive subsidies in both medical fields, the difference between universities and hospitals in the Medicine, Research & Experimental field is very small.

The economists from universities may pay more attention to publication subsidies because one of their main objectives is research. On the other hand, economists from PRI may see research as a byproduct of their policy analysis so they may not be as concerned about publication subsidies. However, the difference between types of institutions is rather modest. Therefore, we cannot claim that there is a significant difference between researchers from different types of institutions regarding their attention to the 250 TL rule.

The percentage of articles that receive subsidy is lower if the authors are from more than one type of institution. Only 42.1% of the articles receive subsidy if the author affiliations involve both PRI and universities. The possible explanation is that the research groups may be larger if they have researchers from more than one type of institution. Therefore, they are less likely to receive subsidy because there are more authors in the paper.

7. Distribution of articles: actual vs. expected

In Figs. 1 and 2, we compare the actual distribution of articles to the expected distribution of articles. First we take all publications in economics and mathematics fields that have Turkish addresses and that were published between 2011 and 2015.[14] We compute the percentage of articles which have one author, two authors, and so on. Let us say that the percentage of articles that have three authors in economics is "T". Then, we compute the expected number of articles that have three authors in economics as follows. We compute the number of economics articles that have Turkish addresses in the journals that have a threshold of two authors and are published in 2014 and 2015. Let's call that number "N". Then, the expected number of articles in economics that have three authors is computed by multiplying N with T. We compare this expected

[12] Chi-square value is 109. Therefore, the difference is significant at 1%.
[13] The number of all domestic articles is 41452 (18606 + 22846). The number of domestic articles that have a threshold number of authors seven or more is 4564 (4485 + 79). Therefore the ratio of domestic articles which have a threshold number of authors that have seven or more authors is 11.0% (4564*100/41452). The ratio of internationally-collaborated papers that have a threshold of seven or more authors is computed similarly.
[14] We restrict our attention to years 2014 and 2015 because we know the rules for subsidy for only these years. However, we take the years 2011–2015 in order to get a better estimate for the number of authors within each field.

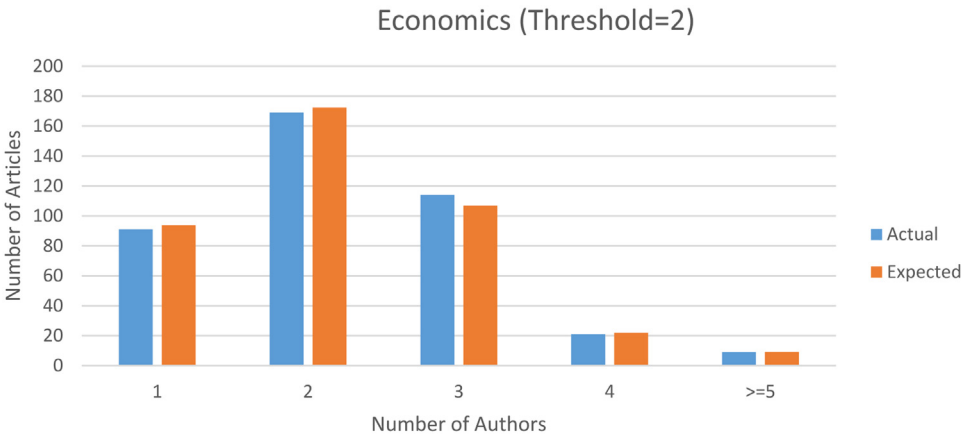

Fig. 1. Economics (Threshold = 2).

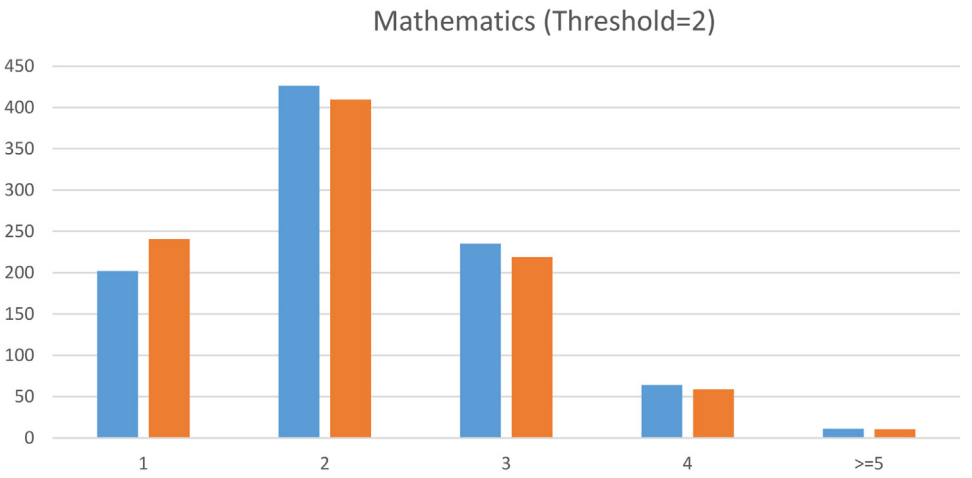

Fig. 2. Mathematics (Threshold = 2).

distribution to the actual distribution of articles that are published in economics journals with a threshold of two authors and that are published in 2014 and 2015.

The expected distribution of articles is computed by using the publications in journals with a threshold of varying number of authors, but the actual distribution is computed by considering the articles in the journals that have a threshold of two authors. If the authors are concerned about the threshold then they are more likely to publish one and two author papers in the actual distribution compared to the expected distribution.

We see that this is actually not the case. The difference between the actual values and the expected values are not statistically significant for any of the six fields that we study.[15] In Fig. 1, the number of articles that have one or two authors are greater in the expected distribution in economics. In Fig. 2, the actual number of articles that have two authors is greater in the actual distribution in mathematics. However, the relation reverses when we compare for single-authored articles. Hence, we cannot see evidence that researchers actually care about research subsidies in either of the figures.

8. Longitudinal analysis

Fig. 3 shows the trend in publications for the six Web of Science fields in Turkey. In addition to the trends of the six fields, the trend in the number of university personnel (including research assistants) and the trend in the Web of Science publications are also included. The year 1990 is the base year for all eight variables.

The publications have increased tremendously. The increase in publications in all six Web of Science fields are well above the trend in the Web of Science publications and the trend in university personnel. Tubitak started its publications subsidies

[15] The Chi-Square values are as follows: Economics (0.65), Mathematics (8.57), Medicine R & E (0.33), Particle Physics (1.37), Political Science (5.95), Surgery (4.55). None of the figures are statistically significant at the 10% level for five degrees of freedom.

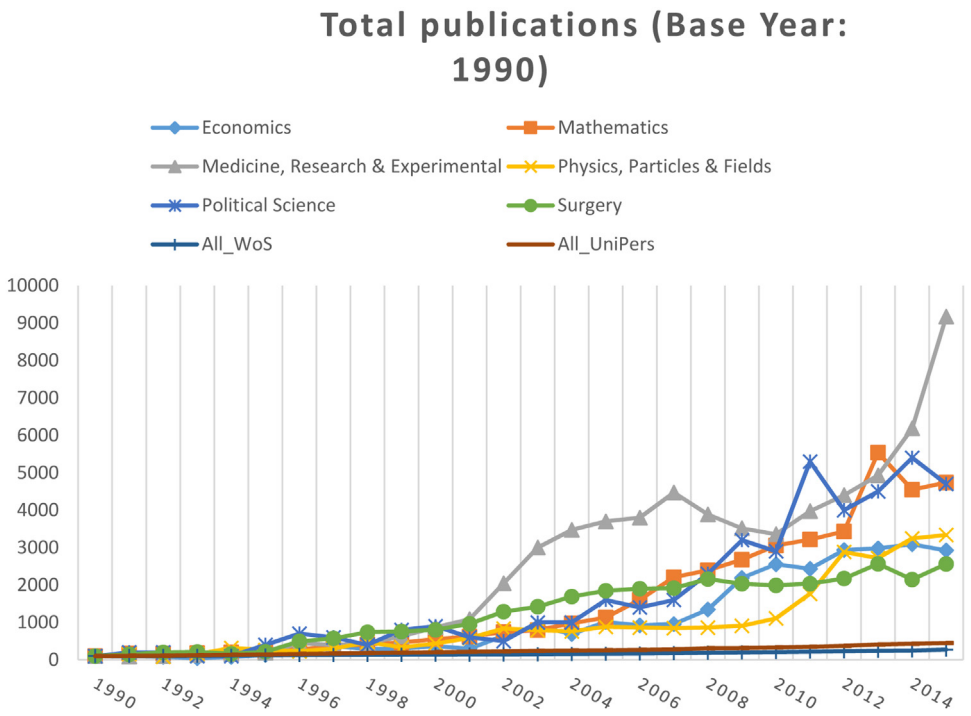

Fig. 3. Total publications (Base Year: 1990).

program in 1993. However, one cannot claim publication subsidies caused the increase in total publications. Because the amount of publication subsidies is rather small, we think that a very small portion (if any) of the publication increase is because of the publication subsidies.

Fig. 4 lays out the average number of authors. The years before the 1990′s are excluded because there are too few publications per field. Particle physics is excluded because the average number of authors have reached to more than a thousand in recent years.

Unfortunately, we do not know when the 250 TL rule was first implemented. The rule gives incentives to decrease the number of authors in the paper, so we expect that the average number of authors declines after the implementation of the rule. However, the average number of authors is either stable or increases through the years. Therefore, there is no evidence that researchers pay attention to the 250 TL rule in this longitudinal analysis as well.

In Fig. 5, the average number of authors for economics publications in Turkey is compared to all of the economics publications. Both variables have very similar values. Therefore, one cannot claim that Turkish economists have decreased the number of authors because of publication subsidies.

9. Percentage of articles that receive subsidy: Turkey vs. foreign (hypothetical)

In this section, the percentage of Turkish-addressed publications that receive a subsidy is compared to that of foreign-addressed publications. Although the foreign-addressed publications are not eligible for reward by Tubitak, we compute their subsidy and treat them as a control group. Naturally, the foreign-addressed authors are not expected to pay any attention to be concerned about the Turkish publication subsidy rules. However, some countries may have publication subsidy rules that are restrictive on the number of authors as well.

The first column of Table 5 lists the countries that are compared to Turkey. The second (fourth) column gives the number of journals where the percentage of Turkish-addressed articles that receive subsidy are higher (lower) than the foreign-addressed articles. For example, if 40% of the Turkish-addressed articles receive subsidy but 20% of the foreign-addressed articles receive subsidy in a journal, then that journal is included to the second column. The third column lists the number of journals where the percentage of Turkish-addressed articles and foreign-addressed articles that receive subsidy are equal.

The last two columns give the number of journals which have statistically significant differences between Turkish and foreign-addressed publications. If percentage of articles that receive a subsidy is significantly higher (lower) in Turkey than the country in comparison for a given journal then the journal is added to the penultimate (ultimate) column.[16]

[16] We apply a z-test and use a five percent significance level.

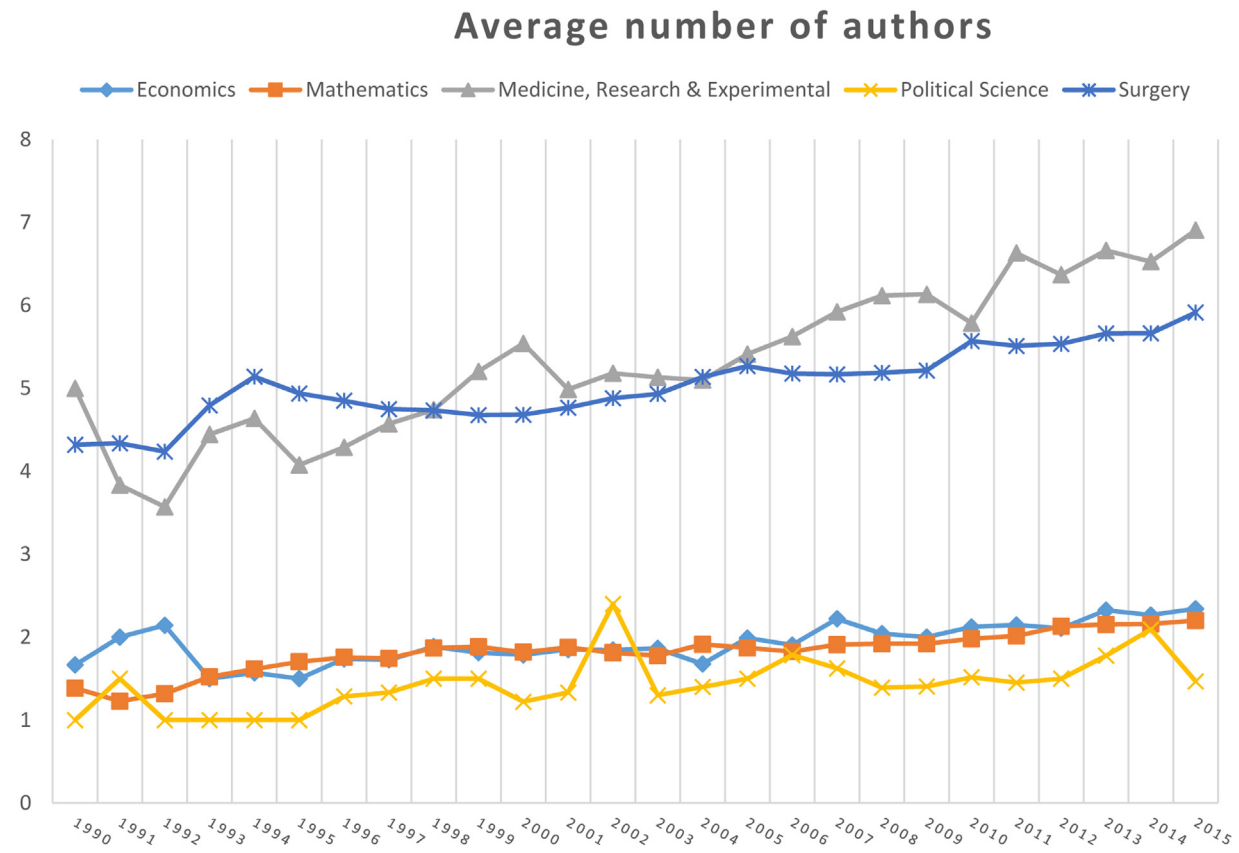

Fig. 4. Average number of authors.

Table 5 shows that the Turkish-addressed articles are more likely to receive subsidies in more journals compared to all 25 countries. For example, we are able to do the comparison for 220 journals between Turkey and China. The percentage of Turkish-addressed articles that receive subsidy is higher for 163 journals whereas the percentage of Chinese-addressed articles that receive subsidy is higher for just 43 journals.

The degree of binary difference between Turkey and a foreign country changes to a great degree. For example, the percentage of Turkish-addressed articles that receive subsidy is higher in 70 journals and the percentage of Spanish-addressed articles that receive subsidy is higher in just 10 journals. In contrast, these numbers are 65 and 54 respectively when we compare Turkey to India.

In the last row of Table 5, we consider all 298 journals that have at least 30 articles that have Turkish addresses and at least 30 articles which have foreign addresses. In 172 journals, the percentage of articles that receive subsidy is higher for the articles that have Turkish addresses compared to the articles that have foreign addresses. In contrast, the percentage of foreign-addressed articles that receive subsidy is higher in 116 journals.

10. Conclusion

We show that because of the 250 TL rule less than half of the articles with a Turkish affiliation receive publication subsidies. This outcome implies that researchers do not give primary importance to publication subsidies. The publication subsidies are relatively small so that the researchers may not take it into account when they decide on the number of authors. Even if the researchers pay attention to the publication subsidies, in some fields there may not be any way to publish a paper without the collaboration of many authors. There are other factors such as academic promotion rules or the non-pecuniary awards of publications that are more important than the publication subsidies.

We do not see the expected effect of the 250 TL rule on the authorship patterns in the longitudinal analysis. The number of authors has increased over time. We would expect the number of authors to decrease if they worried about the 250 TL rule. The expected distribution of articles by considering articles with a threshold of various numbers of authors is also computed. The expected distribution is compared to the actual distribution of articles with a threshold of two authors. The difference in distributions is not in the direction that one expects if authors pay attention to publication subsidies.

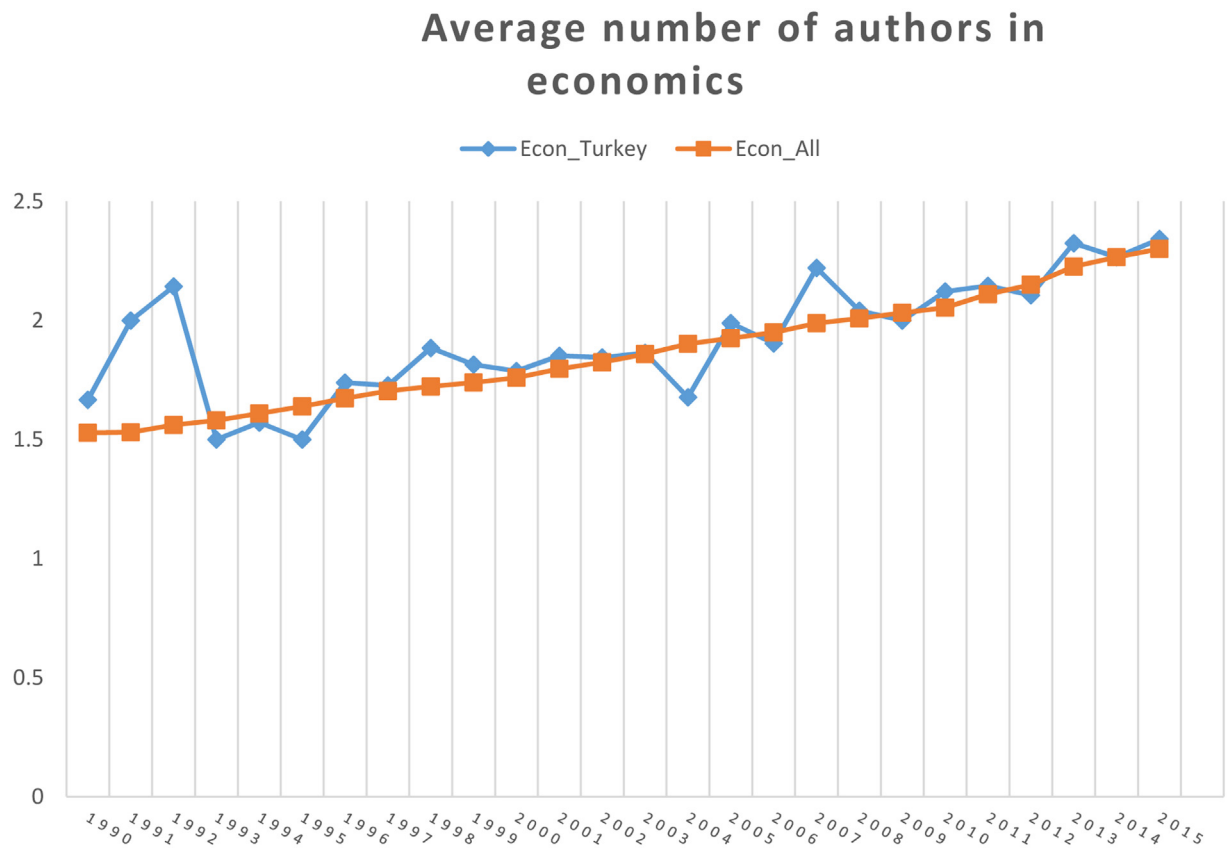

Fig. 5. Average number of authors in economics.

We look for less pronounced effects of publication subsidies by making an international comparison. Although the articles which have no Turkish addresses are not eligible for reward, the portion of such articles that receive subsidy is computed for comparison. We see that the percentage of Turkish- addressed articles that receive subsidy is higher than the foreign-addressed articles for many of the journals. However, there is a considerable number of journals where the percentage of foreign- addressed articles that receive subsidy is higher than the corresponding percentage of the Turkish-addressed articles. Therefore, there is evidence that Turkish researchers pay attention to the 250 TL rule, but the evidence is rather weak.

As a result of this analysis, we conclude that the amount of attention researchers pay to the 250 TL rule is pretty limited. It can be seen as good news and bad news at the same time. It is good news because if researchers paid much attention to the 250 TL rule, then they would limit the extent of their collaboration, which is an unintended and adverse side effect. Because the rule is not effective, we do not observe this adverse side effect. It can be seen as bad news because if researchers do not pay much attention to the 250 TL rule, then their attention to publication rewards that are close to 250 TL may be limited as well. Because more than half of the journals have a subsidy amount less than 1000 TL and the reward is distributed equally among authors, many rewards fall into this category.

Although Tubitak does not specify the actual reason for the 250 TL rule, one of the possible reasons is that it implements the rule to achieve interfield equality. We show that the 250 TL rule has different effects for different fields. The percentage of articles that receive subsidy is as low as 10% in some fields whereas the percentage is as high as 90% in other fields. If the fields where researchers publish more are also the fields where researchers work in larger groups, then the implementation of 250 TL rule would achieve some interfield equality.

Hicks et al. (2015) state that the interfield equality is a problem for research evaluations. Unfortunately, there are no standard bibliometric methods that account for interfield equality. Each institution designs its own formula. The 250 TL rule is a simple but limited approach. Collaboration is important for high-quality research as the authors share their expertise. The 250 TL rule may limit collaboration among researchers. Moreover, the 250 TL rule may create additional inequality for some fields. Suppose that researchers work in large groups but they publish seldom in certain fields. Then the 250 TL rule would worsen the interfield equality among fields.

Hicks et al. (2015) note that research evaluation should be transparent. The Tubitak publication subsidies are transparent except for one step. Tubitak does not disclose its subject categories. Therefore, we are unable to connect the Tubitak subsidy

Table 5
The number of journals where the percentage of Turkish-addressed articles that receive subsidy is higher, equal and lower than that of the foreign-addressed articles.

Country	Number of Journals					
	The percentage of articles that receives subsidy: Turkey vs. Foreign				Significant Difference?	
	Total	Higher in Turkey	Equal	Lower in Turkey	Higher in Turkey	Lower in Turkey
China	220	163	14	43	107	12
USA	165	99	12	54	57	30
India	136	65	17	54	22	19
Italy	116	85	12	19	54	9
South Korea	113	71	13	29	40	11
Iran	111	51	15	45	23	15
Germany	100	71	11	18	42	8
Japan	97	65	12	20	35	6
France	93	72	13	8	55	5
Brazil	92	71	8	13	51	6
Spain	89	70	9	10	44	7
England	86	56	11	19	26	11
Poland	76	49	9	18	18	9
Canada	74	40	12	22	15	10
Taiwan	68	45	8	15	15	4
Australia	64	39	13	12	21	7
Saudi Arabia	49	38	2	9	20	5
Russia	48	32	2	14	24	7
Portugal	44	28	7	9	16	5
Malaysia	41	35	5	1	24	0
Belgium	39	25	7	7	17	6
Mexico	38	28	3	7	16	3
Czech Republic	34	27	1	6	14	2
Netherlands	34	20	5	9	13	4
Sweden	32	22	2	8	10	4
All Countries	298	172	10	116	113	64

awards to basic bibliometrics indicators. We recommend to Tubitak to disclose its subject categories so that researchers are able to understand why their publications are awarded a certain amount of subsidy. Moreover, full transparency helps bibliometric researchers to analyze the implications of publication subsidies at a deeper level.

There are two main problems of the 250 TL rule. First, it makes the publication subsidy compensation scheme discontinuous. Researchers may feel they are treated unfairly when a publication performance that is equal to 249 TL goes unpaid. Second, the 250 TL rule creates uncertainty about whether the reward will be paid. Because there is a time lag between the time when research is performed and the time when a paper is published, researchers will never be sure whether the reward per author might fall below 250 TL by the time their paper is published. The fact that the threshold number of authors changed for more than half of the journals in 2015 reinforces this uncertainty.

We think that the solution is to create standard bibliometric indicators that account for interfield equality. We need a standard bibliometric indicator where an economist and a medical researcher get the same outcome if they put comparable effort to research. This indicator also should not have unintended side effects such as limiting the number of authors or motivating researchers to publish in low quality journals.

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