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Comment on Feige's Paper "Reflections on the Meaning and Measurement of Unobserved Economies: What do we really know about the 'Shadow Economy'?"

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Abstract

This comment provides a reply to Prof. Feige's paper with the title "Reflections on the Meaning and Measurement of Unobserved Economies: What do we really know about the 'Shadow Economy'?", in which Prof. Feige heavily criticizes me. I show that the same critique which Prof. Feige raises against me can be put forward to his results on the non-observed economy. Moreover, I show that my dataset is appropriately documented and I also address the problem of calibration and normalization issues when undertaking a MIMIC estimation. In the concluding chapter I suggest that a joint paper should be written in which all the pros and cons of each method of estimating the size and development of the non-observed/shadow economy are presented and criticized.

JEL-Codes: C510, C820, E260, E410, H260, K420, O170.

Keywords: shadow economy, non-observed economy or income, macro approaches, MIMIC and currency demand approach.

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1 Introduction

In the paper "Reflections on the Meaning and Measurement of Unobserved Economies: What do we really know about the 'Shadow Economy'?" Prof. Edgar L. Feige scientifically attacks me. He writes in the abstract: "… It concludes that Schneider's Shadow Economy (SSE) estimates suffer from conceptual flaws, apparent manipulation of results and insufficient documentation for replication, questioning their place in the academic, policy and popular literature."[1] In this comment I will react to this severe, heavy and in my opinion quite unfair criticism.

In chapter 2 I will make some remarks about Prof. Feige's views on measuring the non-observed economy (NOE). Chapter 3 handles Prof. Feige's claim of insufficient documentation for replication. In chapter 4 I will deal with the problem of calibration and normalization issues when undertaking a MIMIC estimation. In chapter 5, the concluding chapter, I will make some final remarks about the MIMIC estimation procedure and other estimation procedures.

2 Feige's Presentation of Measuring the Non-Observed Economy/Income

In his paper Prof. Feige heavily relies on the following publication: OECD (2002), "Measuring the non-observed economy: A handbook", Paris, France. In his table 1 he presents results about the size and development of the measured non-observed income (Y_{NOE}^{m}) or measured non-observed economy of 15 former Soviet Union countries (from Armenia to Uzbekistan) and of 12 Central Eastern and Eastern European countries (from Albania to Slovenia) using a discrepancy approach. This is an interesting table with quite challenging results. I will make the following critical remarks:

[1] I would like to mention that I have never criticized Prof. Feige in such a severe and drastic way. I always quote him in my papers because he invented the transaction approach to measuring the size and development of the shadow economy and has made other contributions in the debate about measuring the size of the shadow economy. I am aware of his achievements and, hence, have always been quite fair about him in my papers. Compare

2.1 The Sources of Table 1: Can One Replicate the Results?

For the 27 countries the sources of the reported values of the measured non-observed economy (Y_{NOE}^{m}) are personal interviews and personal correspondence including some national statistical offices. Here Prof. Feige should first explain: What does this mean? Were these figures transmitted to Ed Feige by personal correspondence? Is this an official source for this country or not? And how can one examine how these figures are calculated using only this source? At the very least, much more careful documentation should be provided here, so that everyone can check how reliable these results are. This is not possible from the sources given in table 1.

2.2 Accuracy of the Shadow Economy Figures

On page 20 in his paper and in the part "Schneider's Shadow Economy (SSE)" Ed Feige attacked me: "…to have estimated the size and trend of the shadow economy worldwide, for 162 countries to the accuracy of one decimal place…". I am somewhat amazed, because in tables 1 and 2 Ed Feige produces results of the size of different non-observed economies in exactly the same way, e.g. for Armenia for the year 1995 of 31.6% of GDP. However, I always state that these point estimates have a margin error of +/– 15%, while he does not say anything about the possible error of his figures.

2.3 Drastic Changes in the Size of the Shadow Economy

If I look at his figures, there are remarkable changes. Russia had a non-observed economy of 11.9% in 1997 and 1998, and all of a sudden in 2000 it was 24.8% and in 2003 24.3%. So the size of the non-observed economy doubled over two years. In Bulgaria the size of the non-observed economy was 27.8% in 1996, 31.2% in 1997 and fell to 12.3% and 12.0% in the years 1998 and 1999. Hence, in the years 1998 and 1999 the non-observed economy was only about a third of the years before. The value of the non-observed economy of Hungary was always "precisely" 16.0% for the years 1992 to 1999 (exactly the same value for 8 years). Then in the year 2000 it dropped to 11.9% and in 2001 it was again 16.0%. How can this be? No explanation is given. The non-observed economy in Slovenia was

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e.g. Schneider and Enste (2000), Schneider, Buehn and Montenegro (2010) and Schneider and Williams (2013).

between 6.4% and 7.5% from 1995 to 2002 then suddenly keeps stable at "precisely" 8.0% from 2003 to 2007 (5 years). I really think all these changes need an explanation, especially if Prof. Feige heavily criticizes the size of the non-observed economies of my coauthors and me although we never have such jumps in the figures.

2.4 Different Sizes of the Shadow Economy: the Case of Serbia

To give an example as to how the size of these figures also might cause severe doubts about their reliability, I take the example of Serbia. In the book by Gorana Krstić and Friedrich Schneider (eds.) (2015) "Formalizing the Shadow Economy in Serbia", we try to measure the size and development of the shadow economy in Serbia using various methodologically different approaches. The MIMIC procedure was only one of them. We also used the household tax compliance (HTC) method and the survey method and got the following results:

- The estimated value of the shadow economy according to the MIMIC method in the year 2010 was 30.1% of GDP,
- according to the HTC method it was 23.6% in 2010 and
- according to the survey method it was 21.0% of GDP in 2012.

Hence, even with the other methods, which have nothing in common with the MIMIC approach (especially the survey method), much higher values of the shadow economy are estimated, compared to Ed Feige's result of 14.6% in the year 2003.

2.5 The Difference of the Size of the Shadow Economy Between Macro and Other Estimates

Finally, I want to raise the point of whether the size and development of the shadow economy estimated by using a macro approach, either the MIMIC or a currency demand approach, can be so easily compared to the estimates of the non-observed income method which Feige uses. One disadvantage of

the macro methods[2] is that estimations quite often include legally-bought material when showing the estimated size and development of the shadow economy. If one employs a shadow economy worker, he goes to the construction market and buys the necessary things which the hired shadow economy worker needs to do his job, but these are legally-bought goods which are already counted in official GDP and which are taxed. In order to compare macro approaches with other approaches, one should substract the legally-bought material.[3] If one undertakes such a correction, one can make the assumption that roughly 20% needs to be deducted from these macro shadow economy measures to allow for legally-bought material which is already counted in official GDP.

In table 1 an example for the size of the German shadow economy is given in order to explain the estimated difference between the survey approach, which traditionally results in much lower estimated values, and the MIMIC approach. Table 1 clearly shows that the MIMIC approach for the German shadow economy reached results between 15.5% and 16.0% of GDP (100% normalized), while material used accounts for 19.0% to 25.0% of the total shadow economy, illegal activities account for 27.0% to 30.0% and shadow economy activities already included in official GDP make up 6.0% to 12.0%. Table 1 nicely demonstrates that we have different results with respect to the method used to estimate the size and development of the shadow economy.

[2] I have raised this question in several publications, e.g. in Enste and Schneider (2006), Schneider and Williams (2013), and Williams and Schneider (2016).

[3] This is a difficult task as we do not have good data on this. Data exists only for Germany, where several surveys have been undertaken to use a micro approach for estimating the shadow economy. Compare the references in table 1.

Table 1: Size of the shadow economy in Germany in the year 2005 using different estimation approaches

Estimation approach	in % of off. GDP	in Bill. Euros	in % of the total shadow economy in Germany
survey about black labor as value-added provided by Feld and Larsen (2012a)	3.6%	70	22.5%
+ corrections of the survey, see e.g. Feld and Larsen (2012a, p. 61)	5.1%	112	32%
+ material used	3.0–4.0%	65–90	19–25%
+ illegal activities	4.3-4.8%	90–105	27–30%
+ already in the official GDP included shadow economy activities	1.0–2.0%	20–40	6–12%
Shadow economy using the MIMIC procedure (for calibration the currency demand approach)	15.5–16.0%	340–350	100%

Table source: Enste and Schneider (2006), Table 2, p. 188.
Sources of the representative survey: Feld and Larsen (2005, 2012a, b) and Pedersen (2003).
The source of illegal activities and official material used are based on a survey of TNS-Emnid (2004) ordered by the German research institute IW, Cologne.

In his table 2 Ed Feige undertakes a comparison with my estimates for the former Soviet Union countries, the Central Eastern European countries and some Western OECD countries. He took the averages from his table 1, with widely different time series for the 27 countries (one available year up to 12 available years), and from a study of the United Nations Economics Commission for Europe (2008). What is really amazing is that the Netherlands should only have, according to the accounting method, a shadow economy of 1%, Norway of 1.7%, Sweden of 1.3% and Turkey of 1.7%; remarkably low values. With the same measurement method Austria has a shadow economy of 7.9%, which is remarkably high. No explanation is given. Just the values are taken. If I make a comparison over the years 2000 to 2002, for which Feige has values for most countries, and compare them with my figures in Schneider, Buehn and Montenegro (2010), I get the following results shown in table 2. Moreover, in table 3 I show a comparison of the UN estimates (UN, 2008), which Ed Feige used, and my estimates for OECD and European Union members. In both tables 2 and 3 I also deducted 20% in one column

for used material (officially bought) and one sees that even without the correction the difference is not as large as Ed Feige reports in his table 2.[4] Feige's table 2 leaves at least two questions open:

(i) What is the precise period of the average? Is this period different from country to country? If so it should be stated.

(ii) How can an interested researcher verify these results and from where does he get the necessary documentation?

Table 2: A comparison of Feige's and Schneider's (with coauthors) average estimates for the non-observed economy over 2000 to 2002 in % of GDP

Country	Feige's estimates				Schneider's estimates					Ratio S.Av./ F.Av.	Ratio reduced S.Av/ F.Av.
	2000	2001	2002	Av.	2000	2001	2002	Av.	Av. (–20%)		
Albania	34.2	30.4	30.5	31.7	35.3	34.9	34.7	35.0	28.0	**1.10**	**0.88**
Armenia	30.2	28.2	29.4	29.3	46.3	45.4	44.5	45.4	36.3	**1.55**	**1.24**
Azerbaijan	19.5	22.7	19.2	20.5	60.6	60.3	60.0	60.3	48.2	**2.95**	**2.35**
Belarus	11.1	10.6	11.1	10.9	48.1	47.9	47.6	47.9	38.3	**4.38**	**3.52**
Bulgaria	16.3	10.2	n.v.	13.3	36.9	36.6	36.1	36.5	29.2	**2.76**	**2.20**
Croatia	8.5	8.3	8.2	8.3	33.4	33.2	32.6	33.1	26.5	**3.97**	**3.19**
Czech Rep.	7.7	7.5	6.9	7.4	19.1	18.9	18.8	18.9	15.1	**2.57**	**2.04**
Estonia	8.9	7.4	9.6	8.6	32.7	32.4	32.0	32.4	25.9	**3.75**	**3.01**
Georgia	33.7	33.4	33.2	33.4	67.3	67.2	67.2	67.2	53.8	**2.01**	**1.61**
Hungary	11.9	16.0	n.v.	14.0	25.1	24.8	24.5	24.8	19.8	**1.78**	**1.42**
Kazakhstan	24.7	23.9	22.6	23.7	43.2	42.5	42.0	42.6	34.1	**1.79**	**1.44**
Kyrgyzstan	13.1	14.4	16.5	14.7	41.2	40.8	41.4	41.1	32.9	**2.80**	**2.24**
Latvia	18.0	17.5	16.0	17.2	30.5	30.1	29.8	30.1	24.1	**1.76**	**1.40**
Lithuania	18.0	18.3	18.9	18.4	33.7	33.3	32.8	33.3	26.6	**1.81**	**1.45**
Macedonia	12.9	14.9	14.4	14.1	38.2	39.1	38.9	38.7	31.0	**2.75**	**2.20**
Moldova	34.6	31.6	n.v.	33.1	45.1	44.1	44.5	44.6	35.7	**1.35**	**1.08**
Poland	14.6	14.3	15.4	14.8	27.6	27.7	27.7	27.7	22.2	**1.87**	**1.50**
Romania	21.1	n.v.	17.7	19.4	34.4	33.7	33.5	33.9	27.1	**1.75**	**1.40**
Russia	24.8	n.v.	n.v.	24.8	46.1	45.3	44.5	45.3	36.2	**1.83**	**1.46**
Slovakia	14.9	15.2	14.6	14.9	18.9	18.8	18.6	18.8	15.0	**1.26**	**1.01**
Slovenia	6.9	6.8	7.5	7.1	27.1	26.7	26.6	26.8	21.4	**3.79**	**3.02**
Ukraine	20.0	16.3	17.7	18.0	52.2	51.4	50.8	51.5	41.2	**2.86**	**2.29**

n.v. = no value; Sources: Schneider, Buehn and Montenegro (2010, pp. 454–456), Feige (2016, p. 14).

[4] The extremely low values of the Netherlands with 1.0% and Sweden with 1.3% are not plausible at all. Compare e.g. Kazemier (2006) and Williams and Schneider (2016, p. 53), where Kazemier reports a result of 9.1% using the survey method.

Table 3: A comparison of UN (used by Feige) and Schneider's (with coauthors) estimates for the non-observed economy for some OECD-EU members for various years in % of GDP

Country	Year	UN estimates	Schneider's estimates	Schneider's estimates reduced by 20%	Ratio Schneider/ UN	Ratio Schneider (reduced)/ UN
Austria	2001	7.9	9.7	7.8	**1.23**	**0.98**
Belgium	2002	3.0–4.0	22.0	17.6	**5.50–7.33**	**4.40–5.87**
Finland	2001	Not stated	17.9	14.3	-	-
Germany	2001	Not stated	15.9	12.7	-	-
Ireland	1998	4.0	16.1 (1999)	12.9	**4.03**	**3.22**
Italy	2003	14.8–16.7	27.0	21.6	**1.62–1.82**	**1.29–1.46**
Netherlands	1995	1.0	13.3 (1999)	10.6	**13.30**	**10.64**
Spain	2000	11.2	22.7	18.2	**2.03**	**1.62**
Sweden	2000	1.3	19.2	15.4	**14.77**	**11.82**
United Kingdom	2001	Not stated	12.6	10.1	-	-

Sources: Schneider, Buehn and Montenegro (2010, pp. 454–456), UN (2008, p. 10).

3 Insufficient Documentation of the Data Used by My Coauthors and Me

Another heavy claim and criticism in Ed Feige's paper is, as Ed Feige writes: …"It concludes that SSE estimates suffer from … insufficient documentation for replication…". This is a very strong claim which is absolutely not true. My coauthors (Andreas Buehn, Roberto Dell'Anno, Egle Tafenau, Helmut Herwartz, Dominik Enste, Lars Feld, etc.) and I always take great care that everyone who wants the dataset can have it. The most requested dataset is the one from Schneider, Buehn and Montenegro (2010), where estimates for 162 countries were published for the period 1999 to 2006/07 in the International Economic Journal, Vol. 24/4. I have sent this dataset to so many interested researchers that I have stopped counting them. And let me clearly say, Ed Feige also received access to this dataset. In a mail from July 16, 2012, 9:30 pm, Andreas Buehn sent Ed Feige detailed information including a description of calibration methodology and five papers that provide background information on the MIMIC procedure itself, different calibration methods as well as exogenous estimates used for calibration. In a mail to Ed Feige from July 17, 2013, 12:27 pm, I sent Ed Feige requested

documentation, LISREL programme code and an explanation and description of the variables for the World Bank paper again. My coauthors and I gave him several specifications, we provided him with the description of variables used in the model, the definition of the variables used in the model, and detailed documentation relating to the World Bank paper, including the list of variables and the do-files. He also got the data which we used in the World Bank working paper and later on in the published paper. [5] Moreover, on June 7, 2013, I sent him documentation of the size of the shadow economies in 179 countries, in which the figures for the MIMIC calibration procedure, starting in Albania and ending with Zimbabwe, were shown. I provided him the exact sources, e.g. for Albania there were 7 sources, where 3 sources were from quite different authors. Later on I sent him another document with the title "A preliminary documentation of the size of the shadow economy of 27 selected countries: The figures for the MIMIC calibration procedure", which completed my first dataset and in this second documentation none of the sources are from me or my coauthors. I really think one cannot do more. In a mail from November 25, 2013, I asked him whether he had received all the necessary data and in the third point of my mail I asked him: "Would you be willing to send me a similar detailed documentation of the econometric estimates of your last paper, I mean the paper Feige & Urban published in 2008, in order to estimate the size and development of the shadow economy?". I never got an answer, I never got the data, not even a reply.

To summarize: I have provided Ed Feige with all the necessary data.[6] I believe I have fulfilled all tasks and Ed Feige never reacted to my requests to send me his data and do-files, in order to be better able to understand what he did in his paper "Measuring Underground (Unobserved, Non-Observed, Unrecorded) Economies in Transition Countries: Can we Trust GDP?", jointly written with Ivica Urban. Hence, I really think his statement is not true at all.[7]

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[5] Andreas Buehn did send him the data in a zip-file on May 16, 2012.

[6] Ed Feige admits for example that Breusch (2005) succeeded in replicating the earlier study of Dell'Anno and Schneider (2003) and the Asia-Pacific study by Bajada and Schneider (2005).

[7] What is also not true is that we provided the data in 2016, which he writes in footnote 34 in his paper. We pro-

4 Calibration and Normalization Issues When Undertaking a MIMIC Estimation

Here I want to raise two points:

The first is which of the indicator variables should be normalized and, further, whether it makes sense to normalize GDP with –1. In the papers of my coauthors (Dell'Anno, Buehn, Enste, Herwartz, Tafenau, Feld) and myself we normally assume a coefficient of real GDP of –1 (in 12 out of 13 cases, see table 3 of Ed Feige), which is derived from the theory that an increase in shadow economy activities has a negative effect on official GDP development. An increase in the shadow economy absorbs labor resources from the official economy, reducing labor supply in the official economy. Hence, assuming a negative coefficient is theoretically absolutely plausible. It is also absolutely plausible to assume that the coefficient of variable measuring currency holdings, if such an indicator variable was used, has a value of +1, because the higher the shadow economy, the higher currency holdings should be. Also it is theoretically plausible to assume that the average official working time per week can be normalized to –1, as the more people work in the official economy, the less time they have to work in the shadow economy. Hence, these assumptions are not arbitrary but based on theoretical grounds.

To summarize: The logic behind choosing the reference indicator GDP and its associated sign of –1 is the reasoning that that the shadow economy absorbs human capital and ressources from the official economy, leading to negative effects. And it is also theoretically highly plausible that the higher the tax burden, the more regulation and the lower the tax morale, ceteris paribus, the higher the shadow economy will be. Most studies show this (compare Schneider and Enste, 2000, and Schneider, 2015). Hence, this is not an arbitrary choice! Moreover, instead of normalizing GDP to –1, the variable "currency holdings" is often used and normalized to +1, assuming that the higher the shadow economy, the higher the amount of cash used, ceteris paribus. This alternative produces the same re-

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vided the data in 2012 and 2013, hence, over three years ago.

sults as a positive influence of the tax rate, of the regulation index and a negative influence of tax morale, and these results are completetely independent from the normalization of GDP.

The second point that Prof. Feige quite lengthily discussed was a mistake Andreas Buehn and myself made when undertaking the calibration of the shadow economy values for 162 countries. With no intention, a sign error occurred in an Excel file. Unemployment was shrinking for almost all countries over the years 1999 to 2007 and due to the mistake the positive coefficient of unemployment was multiplied by –1. Hence, we found an increase in the shadow economy. Unfortunately, this mistake, which we did not realize immediately, occurred. Realizing the mistake we immediately corrected it, updated the dataset and published a revised version of the (working) paper. Such calculation errors can happen and I think we were completely right to correct our dataset, because we have a positive coefficient which is statistically significant in specifications 3, 4, 5 and 6. It was only not statistically significant in specifications 1, 2 and 7 (compare table 1 in Schneider, Buehn and Montenegro (2010), p. 449).

Again, let me summarize: Andreas Buehn and myself regret the calibration error but such a mistake can happen. We have corrected it and published a revised version of our work. And most importantly, it is absolutely not true that we did not offer a further explanation, admitting our mistake – it was an error in the calibration process and not manipulation in the dataset.

5 Concluding Remarks and What Can We Learn?

In this reply I have tried to demonstrate that the quite strong and extreme accusations Ed Feige makes against the estimates of the size and development of the shadow economy of my coauthors and myself are really not justified. Of course, we all have to learn and we are aware that the MIMIC estimation procedure is a difficult one; one has to be careful when applying it and also needs to point out its weaknesses. In many of my contributions I did this. However, all methods trying to capture the size and development of the shadow economy should be treated in the same way. Also the discrepancy

approach between national income and income statistics and similar, related approaches have been criticized (see for example Schneider and Enste, 2000, and especially Thomas, 1992).

Let me put forward another type of argument: I do not find it scientifically useful and stimulating for achieving progress in economics if one criticizes the currency demand approach and the MIMIC approach in such a drastic way that these two approaches cannot and should never be used. This is more or less what Ed Feige is arguing. If I consider the methods he uses, especially the national income accounting framework and deriving from this the size of non-observed income and/or the non-observed economy, it is obvious that this approach, which is most often used by national accountants, is as problematic as the currency demand and/or MIMIC method, especially as it is very difficult to verify the sizes of the shadow economy calculated by this approach. Except for national accountants in national statistical offices, no one has access to the data and no one can see what the crucial assumptions are and how the figures were precisely calculated. This is also not done by Ed Feige in this paper. Hence, we have the problem that the results of these approaches are difficult if not impossible to replicate, that we do not know assumptions and therefore do not know the variety of results. If one analyzes the results in table 1 by Ed Feige one observes huge jumps in the estimated values, e.g. a doubling of the non-observed economy or a shrinking of the non-observed economy by 50% within a year. All is possible.[8] I really think one should criticize all possible methods to estimate the non-observed and/or shadow economy, and not just pick two of these methods and claim that they are not applicable because a lot of possible errors may happen. The MIMIC and currency demand approaches have the big advantage that everyone can use the data and make his own calculations and compare them to the existing results both from these two macro methods and also other methods. This is not possible with approaches which rely on national income statistics. To conclude: I am convinced that in order to estimate the size and development of a non-observed or shadow economy one should use all

[8] Ed Feige does not provide the necessary sources and documentation to make it possible to check and verify the results in table 1 and table 2 in his paper. Neither the measurement of non-observed income by national statistical accounts in Feige's paper (2016), nor tables 4 and 5 in the paper by Feige and Urban (2008), can be verified.

possible approaches, carefully explain the advantages and disadvantages and compare the results. Then one might be able to come closer to a realistic value for the size of a shadow or non-observed economy. Furthermore, micro studies investigating why people work in the shadow economy and how much they work on an aggregate level are an interesting complement to the macro approaches, as I showed for example for the cases of Serbia and Germany. I think we should stop condemning the two macro approaches, be similarly critical towards the other ones and compare the results of all approaches. Only then will we make scientific progress.

Let me conclude, I really regret this dispute. I think it would be much more productive if Prof. Feige and I were to write a joint paper, clearly pointing to the differences between the various methods, but showing the reader all results, criticizing them, and allowing the reader to make his own judgement regarding which value of the size and development of the shadow economy is more plausible. I have made this offer before and I am making it again.

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