

The Shadow Economy and Implications for Money Demand in Germany

by

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Abstract

Taking into account that recorded output understates actual output is important to improve economic models and for better empirical policy analysis. Using the shadow economy data presented in Buehn et al. (2009) we provide some new results on modelling the demand for money in Germany. We find that the elasticity for money is much smaller with respect to the shadow economy than for official GDP. Estimating an error correction model for money demand in Germany in the second step, we find that the inclusion of the shadow economy measures amplifies the money demand relationship in Germany clearly.

JEL-Classification: O17, K42, F14

Keywords: Shadow Economy, Money Demand, Error correction models, Germany

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1 Introduction

In this paper we use recent information about measures for the German shadow (underground) economy to provide some new results on modelling the demand for money in Germany. To improve economic models and for empirical policy analysis it is important to allow for the underground economy in the construction of such models.

Generally, detailed information on the output of the hidden economy is unavailable. Even where careful measures of the underground economy were constructed, these data are often available only periodically. Important exceptions include the classic results of Tanzi (1983) for the United States, and Bhattacharyya's (1990) series for the United Kingdom. In the case of the New Zealand economy, a time-series of data on the hidden economy has been generated by Giles (1997). Also, Friedrich Schneider and Roberto Dell'Anno do extensive research in the field of the shadow economy estimating its size in various – typically OECD – countries, using the multiple indicator multiple causes (MIMIC) model. In a recent paper, Buehn et al. (2009) estimate size and development of the shadow and the do-it-yourself economy in Germany between 1970 and 2005. Their estimates provides the unusual opportunity to undertake econometric modelling in a way which takes account of such activity formally. Moreover, we can examine the policy implications arising from the linkages between hidden output and a measured economic aggregate like money demand. While most authors dealing with the shadow economy try to estimate its size, the implications for economic modelling have often been neglected until now.

Although, historically, empirical measures of the hidden economy have varied enormously in terms of the methodology employed, the reliability of the data, and the magnitudes that have been estimated, there is compelling evidence regarding certain aspects of this phenomenon. First, it seems clear that the size of the hidden economy has been growing (not only in actual nominal and real terms, but also relative to recorded GDP) over the past two or three decades, in almost all of the countries for which comparative data have

been assembled. Second, there is evidence that this growth in the underground economy is associated with increases in the actual or perceived tax burden. Third, there is evidence that there is a similar association between underground economic activity and the degree of economic regulation. Rather than go into a detailed documentation of these assertions here, the reader can consult the excellent discussion and references in Schneider and Enste (2000, 2002), for example.

The rest of the paper is organized as follows: Section 2 deals with the shadow economy, in general. In section 3 we focus on the German shadow economy, in particular. Section 4 explains the empirical methodology and presents the estimation results. Section 5 concludes.

2 The Shadow Economy

As the shadow economy is a *per se* unobservable economic phenomenon, it is *a priori* necessary to provide an appropriate working definition. Also, a separation from the official part of the economy is helpful to develop a reasonable consensus of the shadow economy.

To understand the shadow economy phenomenon the dual economy approach as shown in Figure 1 is helpful. The official part of the dual economy comprises all economic activities, public and private, which follow the rules of society and are subject to taxation. Thus, all official economic activities contribute to the officially measured GDP. In contrast, unofficial economic activities are totally private and do not contribute to the official GDP. The unofficial economy itself separates into the shadow and the do-it-yourself economy. It is important to note, however, that the main difference between do-it-yourself and shadow economic activities is that the former are entirely legal.

[Insert Figure 1 about here]

Do-it-yourself activities include all market-based goods and services which are produced do-it-yourself in order to avoid gross wage payments, including taxes and social security contributions, in the official economy or to avoid any net wage payments in the shadow economy.

The shadow economy is often defined as all currently unregistered economic activities that contribute to the officially calculated (observed) Gross National Product. This definition is used for example, by Feige (1989), (1994), and Frey and Pommerehne (1984). Smith (1994, p. 18) defines the shadow economy as, “market-based production of goods and services, whether legal or illegal that escapes detection in the official estimates of GDP”. One of the broadest definitions interprets the shadow economy as those economic activities and the income derived from them that circumvent government regulation, taxation or observation. In this paper, the following, more narrow definition of the shadow economy is used: The shadow economy includes all market-based, lawful produced goods and services that are deliberately concealed from public authorities to avoid payment of income, value added or other taxes and social security contributions; to get around certain legal labour market standards, such as minimum wages, maximum working hours, safety standards, etc.; or to prevent administrative procedures, such as filling in forms and statistical questionnaires. As these definitions still leave some wiggle room, Table 1 might be helpful to develop a reasonable consensus on the definition of the shadow economy.

[Insert Table 1 about here]

Consequently, the shadow economy includes unreported income from otherwise official trade in goods and services, e.g. through monetary or barter transactions – and thus includes all economic activities that would generally be taxable were they reported to governmental (tax) authorities. Most studies use a more narrow definition of the shadow economy: the shadow

economy includes all market-based, lawful trade in goods and services that are deliberately concealed from public authorities for one of the following reasons:

- (1) to avoid payment of income, value added or other taxes;
- (2) to avoid payment of social security contributions;
- (3) to avoid certain legal labour market standards, such as minimum wages, maximum working hours, safety standards, etc.; or,
- (4) to avoid compliance with administrative procedures, such as filling in statistical questionnaires or other administrative forms.

Consequently, the shadow economy estimates used in this paper do not cover typical, underground criminal activities, such as burglary, robbery, or drug dealing, which are all illegal. Rather, these figures reveal the size of neglected shadow economic activities.

3 The Shadow Economy in Germany

The oldest estimate of the German shadow economy uses the survey method of the Institute for Demoscopy (IFD) in Allensbach, Germany and shows that the shadow economy was 3.6% of official GDP in 1974 (IFD 1975). In a much later study, Feld and Larsen (2005) undertook an extensive research project using the survey method to estimate shadow economic activities in the years 2001 and 2004. Using the officially paid wage rate, they concluded that these activities reached 4.1% in 2001 and 3.1% in 2004. Using the (much lower) shadow economy wage rate, however, these estimates shrink to 1.3% and 1.0%, respectively. If one looks at the discrepancy method the German shadow economy is much larger: using the discrepancy between expenditure and income it amounts to approximately 11% for the 1970s, and using the discrepancy between official and actual employment, to roughly 30%.

The physical input methods deliver values of around 15% for the second half of the 1980s.

The (monetary) transaction approach developed by Feige (1996) places the shadow economy at 30% between 1980 and 1985. Yet another monetary approach – the currency demand

approach firstly undertaken by Kirchgässner (1983) for Germany – provides values of 3.1% (1970) and 10.3% (1980). His estimates are quite similar to the ones obtained by Schneider and Enste (2000), who also used a currency demand approach to value the size of the shadow economy at 4.5% in 1970 and 14.7% in 2000. Finally, if we look at latent multiple indicators multiple causes (MIMIC) estimation procedures, the first ones being conducted by Frey and Weck-Hannemann (1984), the estimations for the 1970s are quite similar. Later on, Schneider (2005) and others (e.g. Pickhardt and Pones 2006) followed estimating figures which are close to those of the currency demand approach. Surely, figures placing the size of the shadow economy at almost one-third of official GDP in the mid-1980s are most likely overestimates. In a recent paper Buehn et al. (2009) present consistent structural equation (SEM) estimate of the size and development of the shadow economy and of do-it-yourself (DIY) activities in Germany from 1970 to 2005. With respect to the shadow economy, they find, employing a MIMIC approach, that the shadow economy reached a level of about 17% of official GDP by 2005. Table 2 presents a comprehensive summary of shadow economy estimates for Germany.

[Insert Table 2 about here]

4 The Demand for Money, Revisited

Using the shadow economy data presented in Buehn et al. (2009), we provide some new results on modelling the demand for money in Germany, taking into account that recorded output understates actual output. As Figure 2 shows, the German shadow economy experienced a remarkable increase over the past 25 years, reaching 17.40% of official GDP in 2005. German reunification in 1990 triggered a steep rise in the shadow economy during the reconstruction period that followed. After East Germany caught up to West Germany's

behavioural patterns, growth in the shadow economy slowed down considerably to the current level of around 17%.

Our estimations of long-run money demand are inspired by German Bundesbank (1995). In a simple money demand specification holdings of M3 nominal balances are determined by a measure of transactions proxied by nominal income. The opportunity costs of holding money relative to financial assets not included in M3 are proxied by yield on public debt securities outstanding. All variables are in natural logarithms. We use quarterly data from Q1 1975 to Q4 1994.

The estimation results are presented in Table 3. While model (1) is the baseline specification, models (2) and (3) are extended by the size of the shadow economy as estimated in Buehn et al. (2009). Unfortunately, their time series data for the German shadow economy is on a yearly basis only. Thus, we interpolate the shadow economy data to obtain quarterly measures for the size of the German shadow economy. For this purpose, we use the Denton procedure which interpolates an annual flow time series by use of an associated "indicator series", imposing the constraints that the interpolated series obeys the annual totals. This methodology which is "relatively simple, robust, and well-suited for large-scale applications" is described in detail in Adriaan et al. (2001).

As indicator series we used the seasonally adjusted quarterly time series of construction orders received. The motivation behind this is given by Schneider (2003) who presents estimates for the sectoral structure of the shadow economy. He finds that the construction sector has a 40% fraction on the whole shadow economy and thus, clearly dominates the shadow economy dynamics. We therefore assume in our interpolation of the yearly shadow economy time series of Buehn et al. (2009), that the intra year dynamics of the shadow economy is mainly driven by the construction sector.

In model (2) we include both the official and the shadow GDP separately. The estimators are still unbiased although we find high collinearity between the variables for the

official and the shadow economy. Because of this high collinearity, we estimate model (3) where we use the total GDP – defined as the sum of official and shadow GDP – instead of the two separate GDP measures. The most interesting finding is that the elasticity for money regarding the shadow economy is much smaller than for official GDP. This confirms the well known fact that transactions in the shadow economy are typically carried out using cash.

[Insert Table 3 about here]

In the next step we estimate an error correction model for money demand in Germany. The error correction model estimations for the German Bundesbank (1995) model, model (2), and model (3) are shown in Table 4. As the DW-statistics shows no clear sign of no correlation in the error correction model we additionally employ the Breusch-Godfrey LM test for autocorrelation which indicates no autocorrelation until lag length 4.

[Insert Table 4 about here]

In addition to the explanatory variables of official GDP, shadow GDP, and the total net financial wealth we employ the following variables. While D86(1) captures the rise in M3 during December 1995 and January 1986 (see Deutsche Bundesbank (1986) for details) D91(1) captures the shift in the series for M3 in the first quarter of 1991. This shift occurred as a result of German reunification: the M3 time series was recorded until Q4 1990 for West Germany only. Imposing D94(4) is motivated by institutional changes, i.e. it captures the decrease of M3 due to flows into newly introduced money market funds.

Our estimations show that the error correction term (EC) is significant with the right sign. Because the left hand side variable is the first difference of the natural log of M3 we can interpret the EC in percent. Thus, the first model shows a correction of a given „mistake“ by

18.9 percent per quarter. The error is *ceteris paribus* corrected after about 5.3 quarters. Although this shows a very stable money demand the inclusion of the shadow economy measures amplifies this relationship clearly. For model (2) and (3) the error correction takes 4.4 and 4.6 quarters, respectively.

4 Conclusions

The very nature of the shadow economy makes one sceptical of any attempts to measure its magnitude, and to use such measures in econometric models designed to aid policy-makers. However, during the past three decades, statistical tools have been developed which make this task less daunting. Coupling this with the widespread international evidence that the shadow economy is large, growing, and at least partially sensitive to fiscal instruments in most countries, we contend that careful attempts to estimate and use measures of the shadow economy should be given higher priority. Even basic evidence on the causal relationships between shadow economy output and other macroeconomic variables is important for policy-making. Moreover, if the policy conclusions arising from structural econometric models, or macroeconomic forecasts, are sensitive to whether or not we take into account the shadow economy, then this has serious implications.

In this paper we used shadow economy estimates for Germany to re-estimate money demand. Not surprisingly, we can confirm that transactions in the shadow economy are typically carried out using cash, i.e the elasticity for money regarding the shadow economy is much smaller than for official GDP. We also find that the error correction for money demand equilibrium is much shorter if we take account for the shadow economy.

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Tables

Table 1. *A Taxonomy of Types of Shadow Economic Activities*

Type of activity	Monetary transactions		Non-monetary transactions	
Illegal activities	Trade in stolen goods, drug dealing and manufacturing, prostitution, gambling, smuggling, fraud, etc.		Barter of drugs, stolen goods, smuggling, etc., production or growing of drugs for own use, theft for own use.	
	Tax evasion	Tax avoidance	Tax evasion	Tax avoidance
Legal activities	Unreported income from self-employment, wages, salaries and assets from unreported work related to official/ lawful goods and services.	Employee discounts, fringe benefits.	Barter of official/lawful goods and services.	All do-it-yourself work and neighbourly help.

Note: The Structure of the table is taken from Lippert and Walker (1997, p. 5) with additional remarks.

Table 2. *The Size of the Shadow Economy in Germany According to Different Methods (in Percentage of Official GDP)*

Method	Shadow economy (in percentage of official GDP) in:								Source
	1970	1975	1980	1985	1990	1995	2000	2005	
Survey	-	3.6 ¹⁾	-	-	-	-	-	-	IfD Allensbach (1975)
	-	-	-	-	-	-	4.1 ²⁾	3.1 ²⁾	Feld and Larsen (2005)
	-	-	-	-	-	-	1.3 ³⁾	1.0 ³⁾	
Discrepancy between expenditure and income	11.0	10.2	13.4	-	-	-	-	-	Lippert and Walker (1997)
Discrepancy between official and actual employment	23.0	38.5	34.0	-	-	-	-	-	Langfeldt (1983)
Physical input method	-	-	-	14.5	14.6	-	-	-	Feld and Larsen (2005)
Transactions approach	17.2	22.3	29.3	31.4	-	-	-	-	
Currency demand approach	3.1	6.0	10.3	-	-	-	-	-	Kirchgässner (1983)
	12.1	11.8	12.6	-	-	-	-	-	Langfeldt (1983, 1984)
	4.5	7.8	9.2	11.3	11.8	12.5	14.7	-	Schneider and Enste (2000)
Latent ((DY)MIMIC) approach	5.8	6.1	8.2	-	-	-	-	-	Frey and Weck (1983)
	-	-	9.4	10.1	11.4	15.1	16.3	-	Pickardt and Pons (2006)
	4.2	5.8	10.8	11.2	12.2	13.9	16.0	15.4	Schneider (2005, 2007b)
	0.1	4.1	7.9	9.8	12.9	16.3	17.6	17.4	Buehn et al. (2009)
Soft modelling	-	8.3 ⁴⁾	-	-	-	-	-	-	Weck-Hannemann (1983)

1) 1974; 2) 2001 and 2004, calculated using wages in the official economy; 3) 2001 and 2004; calculated using actual “black” hourly wages paid; 4)

Average of 1974 and 1975.

Table 3. *Estimation of Money Demand in Germany*

	(Bundesbank 95)	(2)	(3)
Dependent variable	ln_m3_sa	ln_m3_sa	ln_m3_sa
Official GDP	1.054*** (0.0163)	0.981*** (0.0384)	
Shadow GDP		0.0485** (0.0231)	
Total net financial wealth minus nominal GDP	0.223*** (0.0281)	0.161*** (0.0405)	0.208*** (0.0264)
Yield on public debt	-0.537*** (0.178)	-0.655*** (0.183)	-0.495*** (0.166)
Total GDP (official GDP plus shadow GDP)			1.013*** (0.0146)
Constant	0.202*** (0.0741)	0.569*** (0.190)	0.421*** (0.0661)
Observations	80	80	80
Adjusted R-squared	0.998	0.998	0.998

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4. *Error Correction Model for German Money Demand*

	(Buba 95)	(2)	(3)
Dependent variable	$\Delta M3$	$\Delta M3$	$\Delta M3$
$\Delta M3_{t-1}$	0.0348 (0.0585)	0.0365 (0.0557)	0.0425 (0.0566)
ΔGDP	0.643*** (0.0748)	0.576*** (0.0827)	
Δ Total GDP			0.614*** (0.0678)
Δ Shadow GDP		0.0326* (0.0171)	
Δ Total net financial wealth	0.508*** (0.0578)	0.496*** (0.0550)	0.498*** (0.0556)
D86_1	0.0231*** (0.00869)	0.0238*** (0.00836)	0.0241*** (0.00837)
D91_1	0.105*** (0.0116)	0.110*** (0.0118)	0.110*** (0.0108)
D94_4	-0.0234*** (0.00856)	-0.0246*** (0.00841)	-0.0271*** (0.00839)
Error Correction Buba95	-0.189*** (0.0577)		
Error Correction (2)		-0.225*** (0.0578)	
Error Correction (3)			-0.218*** (0.0605)
Observations	78	78	78
Adjusted R-squared	0.886	0.897	0.895
Durbin-Watson d-statistic	1.603749	1.641796	1.646038
Breusch-Godfrey LM test	6.407 (0.1707)	6.205 (0.1844)	5.863 (0.2096)

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figures

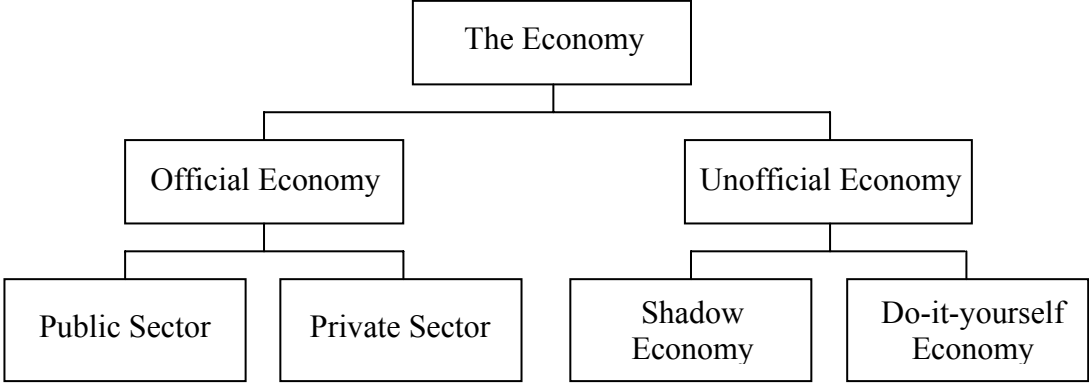


Figure 1

The Official vs. the Unofficial Economy

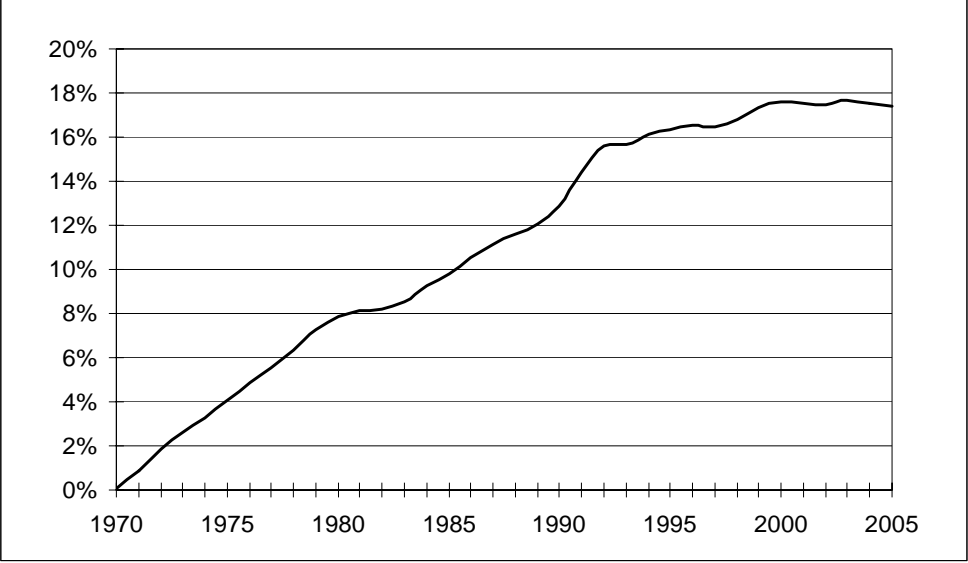


Figure 2

German Shadow Economy in Percentage of GDP (1990:2005)