



*Citation for published version:*

Cullis, J & Morley, B 2017, 'A methodology for determining the 'cash economy' in the European Union via an announcement effect', *European Journal of Law and Economics*, vol. 44, no. 1, pp. 113-129.  
<https://doi.org/10.1007/s10657-014-9451-2>

*DOI:*

[10.1007/s10657-014-9451-2](https://doi.org/10.1007/s10657-014-9451-2)

*Publication date:*

2017

*Document Version*

Early version, also known as pre-print

[Link to publication](#)

## University of Bath

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# A Methodology for Determining the ‘Cash Economy’ in the European Union via an Announcement Effect

John Cullis

University of Bath

and

Bruce Morley\*

University of Bath

## Abstract:

One of the most important policy considerations currently for all governments across the EU concerns the need to increase tax revenue so as to reduce their unsustainable budget deficits. One key policy involves reducing the amount of revenue lost as a result of the ‘cash economy’, but before this is possible they first need to have some idea of its size. This study provides evidence of the importance of the cash economy across the EU and suggests that changes in house prices, when the Euro was formed in 1999 can be used as a basis to measure its magnitude. These results build on the theoretical model on how individuals who wished to hide their domestic cash from the authorities when the European single currency was formed in 1999, would have needed to acquire a physical asset, most likely property. This implies changes in property prices between the announcement of the Euro and its implementation reflect the level of wealth being hidden in this way and therefore the extent of the cash economy.

**Key Words:** European Union; cash economy; informal economy; housing; budget deficit.

J.E.L. K34, R48.

Address for correspondence: Economics Department, University of Bath, Bath, BA2 7AY, UK. Tel. +44 1225 386497, fax: +44 1225 383423, e-mail [bm232@bath.ac.uk](mailto:bm232@bath.ac.uk)

## 1. Introduction

The prevalence of clandestine activities is by definition difficult to measure causing controversy surrounding any reported estimates. The terms: ‘black’/ ‘cash’/ ‘dual’/ ‘hidden’/ ‘informal’/ ‘irregular’/ ‘moonlight’/ ‘non-observed’/ ‘non-official’/ ‘second’/ ‘shadow’/ ‘subterranean’/ ‘twilight’/ ‘underground’/ ‘unmeasured’/ ‘unofficial’/ ‘unrecorded’/ ‘unreported’/ ‘untaxed’/ economy are close to being synonyms, with their very number suggesting the economic importance of the phenomenon they describe. However definitions do vary and in different contexts different terms may be more or less appropriate. For example, the ‘unmeasured’ or ‘unrecorded economy’ draws attention to the implication that official statistics and their use for policy purposes may be suspect if there are measurement failures. Beyond this the current urgent need to raise increased revenue to reduce budget deficits and the related need to encourage economic growth have become two of the most pressing issues in the international political economy, especially in the European Union (EU). ‘Unreported’ income reduces the potential income tax revenue for Governments across the world, where many of them are typically struggling to control their budget deficits. In addition legislation to counteract this problem cannot be introduced until the size and complexity of the ‘cash economy’ (the term selected here and defined below) is better understood. As yet attempts to measure the extent of this problem have produced varying estimates, which can be from between less than 1% to well in excess of 15% of the total economic output. The aim in this study is to suggest a novel measurement methodology to measuring the extent and significance of this aspect of an economy.

There are difficulties in assessing the normative significance to the magnitude of the cash economy. At one extreme, authors see a one for one loss of tax revenue over what it would otherwise have been raised typified in ‘tax gap’ type calculations. At the other extreme the cash economy is seen as a ‘good thing’ serving as a mechanism

to curb the powers of a Leviathan state (see Cullis and Jones, 2009). Overlaid on these arguments is the widespread belief that some cultures and countries are much more prone to be dishonest than others.

The main aim of the study is to use the formation of the European single currency in 1999 as a mechanism for measuring the size and significance of the cash economy in the EU. This paper focuses in particular on the relative importance of the cash economy in some Eurozone countries in the lead up to monetary integration using two other European Union (EU) countries and the USA as control economies. The underlying approach, elaborated below, dates back to authors such as Feige (1989) and Tanzi (1982), however the method is different in that it is essentially an event study (for a description of different methods see Schneider and Enste, 2000)<sup>1</sup>. This paper relies on the observation that ‘Shadow economy transactions tend to be in cash’ (Schneider and Enste, 2002: 7).

Following the introduction, section 2 sets the context of the study reported here, section 3 outlines the theory behind the measurement of the cash economy and section 4 outlines the different EU housing markets and section 5 the empirical approach used. Sections 6, 7 and 8 discuss the data and interpret the results before concluding.

## **2. The literature on the ‘non-official’ economy**

As noted above interest in the non-official economy is very considerable. This is not only for the practical reason of trying to finance public sectors and conduct macroeconomic policy in an equitable and efficient way but also because it is a rich area for both novel social science theorising and empirical work. A recent special issue of *Public Finance Review* (Alm and Prinz (eds) (2013) explicitly recognises the

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<sup>1</sup> Other related studies have analysed the economics of the related topic of money laundering, these include Masciandaro (1999).

connection between the shadow economy, tax evasion and money laundering in that all (untaxed) money earned outside the official economy to be useful must somehow be brought back into the official economy. Further a recent special issue of the *Journal of Economic Psychology* (Muehlbacher, Pickhardt and Prinz (eds) 2014) on Behavioral Dynamics of Tax Evasion emphasises interdisciplinary and multi-methodological work. The editors note: “A trend in tax research is the general acceptance of new methods.” (Muehlbacher et. al. 2014: iv). Work reported in the special issue varies from the use of recently developed econometric techniques and experiments to applying the Ising model of ferromagnetism, from physics, to tax evasion dynamics. Additionally the role of emotions such as shame, sympathy and empathy are explored in the tax evasion context alongside agent based models that analyse artificial societies with different interaction and network structures. In contrast to these studies the work reported here, in part, harks back to an older consideration but sets it in a new specific context where money really ‘must’ be brought back into the official economy. The choice of the term ‘cash’ economy highlights “its use as a medium of exchange and a store of value in the ‘underground’ economy. One of the key attributes of currency is anonymity, since its usage does not leave a paper trail. As such it is the preferred medium for purchasing illegal goods and for hiding income that should be, but is not reported to the tax authority.” (Feige, 2012: 244). In his (2012) study Feige explores the paradox that despite financial innovation which seemed to herald a cashless economy US real per capita currency holding had increased over the twenty years to 2009 by 59%, to some \$2,700, in a context where households and businesses only admit to holding about 15% of the actual US currency supply. This is the ‘currency enigma’ of ‘missing dollars’. Whilst some of the missing dollars can be found in the process of ‘dollarization’ (overseas

holdings of dollars as a hard currency) the ‘new’ figure reported above is a domestic one being net of this ‘dollarization’ sum which the author calculates has been significantly overestimated in the past. In responding to some of the criticisms of Feige’s (1989) general currency ratio model Cebula and Feige (2012) use Feige’s new estimates of domestic US currency holding in estimating that some 18-19% of US total reportable income goes unreported. It is the idea of making ‘missing dollars’ or more generally ‘missing cash’ visible and measurable that motivates the remainder of this paper.

### **3. Theory: “too much cash”**

It is noticeable that if you live in the bed and breakfast area of a tourist city how much gold jewellery adorns landladies, how many new watches landlords have and how often perfectly good windows are replaced. This seemingly excessive acquisition of personal property (personalty) and real property (realty) is typically attributed to the cash economy where landladies and landlords have different mental or even physical boxes in some cases where earnings are placed. These boxes are labelled ‘income for the tax man’ and ‘income for me’. The trouble with ‘cash income for me’ is that there is no easy way to use it without signalling to the tax man that your life style seems incommensurate with your ‘declared’ taxable income, causing suspicion and possible investigation. On the other hand for cash income to have utility it must hold out the possibility of exchange for goods and services. This kind of scenario covers one aspect of the cash economy involving the output of goods and services that are legal (providing bed and breakfast services) but where the production or distribution process involves some illegality (failure to declare income to the tax authorities). Working for cash–in-hand and working off-the- books are similar types of activity.

This is Thomas' (1992) 'irregular sector'. The other area of economies where cash is dominant is in the criminal sector where the goods and services being produced and traded are illegal<sup>2</sup> in themselves (eg. certain drugs, prostitution). The main issue for the successful criminal who manages to accumulate a great deal of cash is how to conceal it from the authorities whilst gaining access to goods and services from it. Typically they are seen as trying to 'launder' cash into the legitimate economy. In short the landlady has a tax evasion problem and the drug dealer has a money laundering one. What is termed the cash economy here then comprises Thomas' irregular and criminal sectors. Unger (2013) discusses how the definition of money laundering has evolved with a precondition for criminalising money laundering being a criminal 'predicate offence'. If both drug dealing and tax evasion are considered a 'predicate offence' as in the, G-7 1989 established, Financial Action Task Force on Money Laundering (FATF) standards then both are subsumed under money laundering. Unger (2013: 662) suggests that "A merging of the definition of tax evasion and money laundering (and perhaps parts of the shadow economy) might help overcome the problems of measuring different sorts of illicit financial activities that have always been difficult to distinguish neatly." In a way the work reported below empirically reflects such a 'merging'.

Unlike definitions of the 'shadow' or 'underground' economy this study excludes non-monetary transactions<sup>3</sup>. If these observations on the cash economy carry weight then at any point in time the major actors involved are rationed to hold too much cash in their net wealth portfolios. Such cash is referred to as 'tainted' below. Indeed the

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<sup>2</sup> What is illegal can vary substantially from economy to economy.

<sup>3</sup> Other theoretical studies have approached modelling the black economy from other perspectives, for instance Huang and Wu (1994) model this phenomenon with respect to the 'social norm' approach.

common phrase that you ‘cannot have too much money’ is erroneous if you are rationed. Whilst typically in economics the axiom of ‘free disposal’ guarantees all rationing takes place on the ‘short’ side, in the cash economy it is the case that ‘forced retention’ is likely to arise. In an asset approach to the demand for cash, where money is seen as a durable capital good (see Friedman 1956) it is typical to see net wealth holders as having a portfolio of assets that can take a real, monetary or human capital form. In an asset approach to the demand for cash, where money is seen as a durable capital good (see Friedman 1956) it is typical to see net wealth holders as having a portfolio of assets that can take a real, monetary or human capital form. That is:

$$W = R + F + HC \quad (1)$$

Where:

W = net or total wealth;

R = real assets eg. housing property;

F = financial assets eg. cash money;

HC = human capital eg. training.

In this context money is viewed as a temporary abode of purchasing power generating an expected stream of future services. In the cash economy the illegal source of cash almost by definition has to be a semi-permanent abode of purchasing power as optimal portfolio adjustments are precluded. In asset theory an equilibrium involves the purchase of each asset up to the point where the present value of the future income stream equals the price of the asset type. In Friedman’s formulation the demand for money is a function of the form:



$$L = f(\underset{-}{re}, \underset{-}{rse}, \underset{-}{pe}, \underset{+}{HC/W}, \underset{+}{P}, \underset{+}{W}) \quad (2)$$

Where new terms are:

L= demand for money;

re = expected rate of returns on bonds;

rse = expected rate of return on stocks;

.pe = expected inflation rate;

HC/W = ratio of human capital to total wealth;

P = permanent price level.

The predicted signs of the variables in the function on the demand for money are indicated under the variables. The simple model postulated here is that the utility of a cash economy actor depends on the quantities of the three assets, one of which Fm is constrained at a supra optimal level. So the actor is seen to maximize:

$$\text{Max}\{U(R, Fm, HC \mid PrR + PfFm + PhcHC = W, Fm = Fm > Fm^*)\} \quad (3)$$

Where Pr, Pf and Phc are the ‘prices’ of real, financial and human capital assets respectively and Fm\* is the equilibrium portfolio holding of Fm.

Forming a Lagrangean:

$$L = U(R, Fm, HC) + \lambda(W - PrR + PfFm + PhcHC) + \mu(Fm - Fm^* + S) \quad (4)$$

Where the third term is the rationing constraint. The first order condition relevant to this analysis is for the surfit asset as it contains an extra term  $\mu$ :

$$\partial L/\partial F_m = \partial U/\partial F_m - \lambda P_f + \mu = 0$$

Recognising this and making the discussion tractable as well as fitting more closely the empirical work discussed below consider figure 1. In the figure there are only two assets cash (Y) and a real asset taken to be real estate or more loosely housing (H). The unconstrained equilibrium, with budget constraint 1-2 is point 3 on  $I_3$ . However consistent with the rationing constraint described above the rationed equilibrium is point 4 on  $I_2$  where the individual has  $y_r$  cash and  $h_r$  housing. As drawn, the individual is indifferent between point 4 and point 5 where the individual has adjusted the quantities of each asset but only by incurring laundering costs that shift the budget constraint to line 6-7 rendering the adjustment a matter of indifference. Indications of laundering costs are gleaned from a number of sources. For example Grossman (1982) reports that in the Soviet Union one way used to launder cash was to buy winning lottery tickets that had yet to be cashed in. Launderers had to pay 1.5 to 2 times the size of the lottery win. That is 1.5 to 2 units of 'tainted' money to 1 unit of legal money.

Francis (1988) describes 'smurfing' where innocent looking, non-descript elderly women are employed to make smallish 'tainted' cash deposits in bank accounts at a large number of banks. Once in the banks the money can be electronically moved around. The fee for this task is reported to range from between 7% and 15% of the amount laundered. More recently the OECD (2009) notes: "Real estate has long been the preferred choice of criminals for hiding ill-gotten gains, and manipulating

property prices is one of the oldest ways to transfer proceeds illegally between parties to a deal.” (OECD 2009:31). The attractions include the relative high purchase prices, possible capital gains and the ability to hide ownership. They describe ‘property flipping’ where two or more transactions take place fairly close together. The seller receives the market value of the property but agrees to accept part of the valuation in ‘tainted cash’. The legal documents record the lower official price which has legitimate finance. The buyer subsequently sells the property for its market value and has appeared to have made a capital gain (equal to the money laundered in). Unger and Ferwerda (2011) similarly consider the real estate sector as one experiencing money laundering problems and using a set of seventeen characteristics (eg. unusual price fluctuations) empirically identify houses or business premises in two Dutch cities that looked suspicious in the light of the characteristics.

Returning to Fig. 1 assuming laundering costs that are marginally above distance 1-6 the rationed equilibrium at 4 remains in force and cash economy actors have almost by definition a great deal of cash at any point in time. What event might disturb this rationed equilibrium? The answer here is a catastrophic change in the price of holding Y. If domestically denominated cash has a price rise tending to infinity, then the utility maximizer is forced to adjust. The key point in this section is that a credible commitment to replace domestic currency with the Euro is just such a catastrophic price change. At a known date in the future cash holding denominated in domestic currency will only have an antique market value. Like it or not the rationing constraint has to be broken and other assets acquired but which ones? In the fuller account this depends on the relative cross elasticity of substitution between human capital and real property. It is likely that this elasticity value is greater for real property than for

human capital so the adjustment postulated is to a point such as the one labelled point 10 on  $I_0$  where the individual has only their justified holding of cash ( $y_e$ ) and a great deal more real property ( $h_e$ ). The budget line has moved to 8-9 to reflect enforced laundering costs of adjustment. If such an account is typical of the majority of actors in the cash economy there should be a rapid and very large increase in the demand for real property and the illegal holding of cash can, other things being equal, be gauged from the capitalisation process that will take place.

In Fig. 2 a simple picture of the housing market is portrayed. Housing as an asset is long lived hence net investment in any year or quarter tends to be a tiny proportion of the existing stock. Given this, the supply of housing ( $Sh$ ) is seen as perfectly inelastic at a quantity  $q_0$ . Ironically equilibrium in stock dominated markets involves an equilibrium price but no trades. In Fig. 2  $D_0$  is the pre-existing demand for the stock of houses and  $P_0$  the equilibrium price. With  $D_0$  and  $Sh$  the market clearing price is  $P_0$  consistent with point 1. At that price  $d_0$  is the demand curve for non-house owners and WTS (the willingness to supply curve) of housing comprising the reservation prices of those individuals who own houses.

The 'willingness to supply' curve is simply the mirror image of  $D_0$  being the trace of the reservation values beginning with the lowest and working up to the highest. With WTS equalling  $d_0$  at  $P_0$  the market will be 'thin' but nevertheless in equilibrium. Assuming that the distances  $y_r$  to  $y_e$  from Fig. 1 are grossed up over all participants in the cash economy it will provide a quantity of tainted money to be laundered into houses. As the quantity is a given sum it seems reasonable to represent the new 'on announcement' demand ( $D_n$ ) for houses as a rectangular hyperbola. This change implies that  $q_n$  of the housing stock will change hands at a price of  $P_1$  set by point 2. The area  $0 - P_1 - 2 - q_n$  is an estimate of the 'tainted' cash in the economy.

That is cash that is being held as a store of value but more likely as the support for illegal activities. Note that this analysis implies that all newly observed house trades are those undertaken by cash economy participants and as such trading would immediately identify you as a money launderer. In reality the market for the stock of real estate will obviously be more complex than this as each period some trades will reflect individual changes of reservation prices making observed housing expenditure in the relevant period a certain overestimate of the stock of tainted money. However there may nevertheless be a case for using that sum as an approximation. In a more complex picture not all such cash will go to housing but to other unanalysed assets whose prices should also increase. For exposition if this heroic assumption is accepted then area  $0 - P_1 - 2 - q_n$  is a 'ball park' estimate of the 'tainted' cash in the economy ( $= C_t$ ). This estimate of the stock of cash when multiplied by a suitable velocity of circulation of tainted money ( $V_t$ ) would provide an estimate of the size of the cash economy expenditure ( $E_t = C_t \cdot V_t$ ).

There is evidence that cash economy participants, especially criminals, have a preference for property. Cocaine money seems to have been invested in real estate so that by the end of the 70's it appeared that 40% of real estate transactions above \$300,000 in Dade county (which includes Miami) came via off-shore corporations associated with cash laundering (Thomas, (1992). This 40% might be applied to  $C_t$  in a sensitivity calculation. As regards the velocity of circulation of 'tainted' cash ( $V_t$ ) there are opposing arguments. If cash is being held as a store of value as well as a medium of exchange then the velocity of circulation of 'tainted' money will be lower than that of cash in the legal economy (Cagan, 1958). On the other hand in the cash economy the recording and monitoring of transactions is avoided making more

transactions per monetary unit attractive. Again sensitivity calculations might be a way forward.

Reverting to the individual level point 10 in Fig. 1 is unlikely to be the final equilibrium as once the cash is laundered into housing further adjustment lowering the holding of housing at a cost represented in the movement of the budget constraint to 11-12 allows a utility maximizer to achieve equilibrium at point 13 on  $I_1$ . The general prediction is that having laundered the cash into property the process will be reversed to an extent to convert housing property into euros giving a pattern of property prices. That is the trend asset price of housing will be displaced upwards until the euro is in circulation in the relevant countries.

If the arguments above are to be more than theoretical speculation then at least some of the steps in the analysis have to be empirically observed or proxied. These are the tasks of later sections. However before looking at the data it is worthwhile to place the key variables, housing markets in different countries, into context.

#### **4. European Housing Markets and the European Single Currency**

When considering a model of EU house prices, the nature of the housing market needs to be taken into consideration. As Maclennan *et al.* (1998) have suggested, housing markets across the EU are very diverse in a number of ways. The main difference concerns the levels of home ownership, but other differences include how the housing is financed, regulations on mortgages and the mortgage industry and how housing is taxed and subsidised. A further complication over recent years has concerned the levels of non-residents owning homes in different countries, either as a holiday home or as an investment. Clearly since the single currency has been

introduced, this has increased, especially in some Mediterranean countries such as Spain.

The housing markets across the EU can be broadly divided into those markets which are based around owner-occupiers and those which rely on the private rented sector, where house price data tends to be more limited. The UK, Ireland and Spain have among the highest levels of owner occupation in the EU and correspondingly high levels of mortgage finance. For instance in the UK about 70% of homes are owner occupied, whilst at the other extreme in Germany it is less than 50%. Clearly the structure of the housing market in the individual countries will affect how house prices respond to income and interest rates, as well as preparation for the Euro.

Another important feature of the EU housing market is that over the last decade countries have retained control of fiscal policy in general and taxation in particular. In addition mortgages are taxed differently across the EU, with some countries having tax deductibility on mortgage payments. As a result of the differences we would not expect the housing markets across the EU to react in the same way to the economic changes implied by the introduction of the Euro. For some economies laundering tainted money into the asset housing will be more attractive than in others.

A further source of divergence across the EU relates to the way in which mortgage finance is constrained in some countries. These constraints are usually imposed as part of the prudential requirements for the financial sector and typically involve limits on the loan to house value. In most countries the limit is below 100% of the house value, although in the UK during the early 2000s mortgages well over this amount were allowed. Traditionally in countries such as Germany and France the limit has been nearer 60%, which again has limited the levels of home ownership. In addition during the 1990s and 2000s the way in which housing was financed changed for some

countries, especially the UK and Ireland, with the rise of securitisation of housing debt and holding the debt in off balance sheet vehicles. In some countries such as Spain this was made illegal, to prevent the collapse of house prices and the financial sector experienced in the UK and Ireland during the end of 2007.

As noted by Muellbauer (1992) not only does the housing market and macroeconomy have a close relationship, but also due to the differences across the EU housing markets, a uniform reaction in house prices to changes in either interest rates or economic growth would not be expected. In addition it would not be expected that all countries produce the same 'cash economy' effect on joining the Euro in 1999. For instance some countries such as Spain with a large overseas interest in their housing economy, the 'cash economy' effect could be drowned out by the effect of potential overseas buyers waiting until the Euro was set up, then buying the property to avoid any exchange rate risk.

The move to a European Single Currency (Euro) began in 1991 with the Maastricht Treaty. This also set five criteria which all potential member states needed to pass before they were allowed to join. The criteria related to important monetary and fiscal measures and were aimed at ensuring all member state's economies had converged sufficiently before the single currency could be formed. In May 1998 eleven European countries had passed these criteria and joined, of those who wished to join only Greece failed to pass the criteria, but subsequently joined in 2002 having met the requirements. The UK also decided not to join and remained outside the ERM. Between January 1999 and December 2001, national currencies remained in circulation as notes and coins, but at irrevocably fixed exchange rates. However bank accounts could be in Euros and all transactions between the European Central bank in



Frankfurt and individual commercial banks were in Euros. Then between January and July of 2002 national currencies were replaced by the Euro.<sup>4</sup>

## **5. An Econometric Model of Property Price Determination**

The model used for the estimation is a standard house price model in which house prices are determined by economic growth and interest rates, as Case and Shiller (1989) suggest these tend to be two of the most widely used house price determinants. A dummy variable representing the window between the announcement of those countries included in the Euro and its implementation has also been included to test whether there was any evidence of excess returns during this time period. This is a similar approach to the use of event studies, where dummy variables are used to measure the effects of a policy change or announcement. In this case instead of using the market model of asset returns, we use a simple model of house prices and incorporate the dummy variable into this. Similar approaches include Frot and Santiso (2013) who test for the effects of political changes on flows of capital into stock markets. Due to the differences in housing markets across the EU it was decided to keep the empirical model as simple as possible, concentrating on the effects most likely to be relevant in all countries studied. As with similar literature on event studies<sup>5</sup>, the house price is in growth form as is the output measure. In effect the

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<sup>4</sup> For a detailed description of the formation and management of the Euro, De Grauwe (2000) has a comprehensive coverage.

<sup>5</sup> Event studies are typically carried out using stock price data and involving either a market model or a form of the Capital Asset Pricing Model (CAPM). A specific policy change is then used incorporating dummy variables to determine if it had a significant effect on the stock price. This approach has similarities in that instead of the return on stock prices, the return on house prices is used. However interpretation of the dummy variable is similar in this case.

house prices are in return form and thus stationary. The econometric model estimated is:

$$\Delta hp_t = \alpha_0 + \alpha_1 \Delta lip + \alpha_2 i_t + \alpha_3 dummy_t + u_t \quad (5)$$

Where  $hp_t$  are the respective real house price measure,  $ip_t$  is real industrial production (both in logarithms),  $i_t$  is the long-term interest rate,  $\Delta$  indicates a differenced variable and  $dummy_t$  is the dummy variable taking the value of zero except for quarters three and four in 1998<sup>6</sup>. This was chosen as the window as it represents the time between when it was announced who could join the Euro and when it came into being. In May 1998 the decision on who had passed the Maastricht criteria was taken and was therefore allowed to join the Euro, then in January 1999 the Euro came into existence. Between these two dates it is most probably that the move into property would most likely have taken place. If the ‘cash economy’ effect is the case, then a positive and significant coefficient on the dummy variable would be anticipated.

## 6. The Data, Results and Discussion

The countries used for the estimation include four members of the European single currency where the announcement effect is predicted. The member states included for this purpose are the Netherlands and Ireland, representing Northern Europe, France in

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<sup>6</sup> However this event is likely to have been a leaky one, with some individuals anticipating that their countries would be allowed to join before May 1998. As a result other windows were included in the model, for instance with the ‘window’ of ones from 1991 (signing of Maastricht treaty) to 1999, however these tended not to work as well as the ‘window’ used. Finding the appropriate ‘window’ length is a common problem with event type studies, as there is no set way of determining it, the approach used here has been based on policy changes as well as the best empirical fit.

the middle and Spain which represent southern Europe<sup>7</sup>. In order to have some control countries where no significant coefficient on the dummy variable would be anticipated other comparator countries were ‘tested’. They can be divided into internal to the EU controls and an external to the EU control. The internal controls are Sweden and the UK. The external control country with no links to the EU is the USA. The data is all quarterly, except the USA which has monthly data, but the data ranges from 1978 q1 for Ireland to 2008 q4. However due to lack of data the estimation for the other countries was over a more limited time span. For the other countries the data begins in 1985 and 1986 for the Netherlands and Sweden respectively and 1995 and 1996 for Spain and France respectively.

In this study industrial production has been used rather Gross Domestic Product (GDP), again due the lack of quarterly data for some countries. The interest rate is the return on long-term Government bonds, as this tends to be similar to the rate for mortgages. The dummy variable takes the value of zero except the last two quarters of 1998. This is to reflect the time span immediately prior to the formation of the single currency in 1999 and the announcement in May 1998 of those countries that had satisfied the Maastricht criteria and so were allowed to join.

The results of estimating equation (5) are recorded in Table 1. The key question is whether there is an announcement effect present in the estimates. The dummy

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<sup>7</sup> A potential alternative to the individual time series approach used here, would have been to construct a panel of these countries. This was used in Goodhart and Hofmann (2006) to determine causality between the housing market and other macroeconomic factors. However there is likely to be considerable heterogeneity across these EU housing markets as noted earlier, which would induce bias into our estimates. In addition we are not expecting this effect to be relevant in all the countries in this sample, so the time series is more suited to our overall aims.

variables are significant in all specifications except Sweden, UK and the USA as expected as these are the control countries. For the Netherlands, France and Ireland the dummy variable is positively signed suggesting a rise in house prices immediately before the single currency was formed. The coefficient on the dummy variable can be interpreted as the abnormal return on holding the housing asset during the last six months of 1999. Ireland has the highest value and France the lowest, suggesting over the six months Ireland enjoyed a 0.045% return above what would have been expected.

For Spain the effect is negative, however it can be argued that the Spanish housing market during this time fundamentally differed to that in the rest of the EU, as there was a substantial demand for holiday homes in Spain from outside Spain and across the EU. However many potential buyers were waiting until the single currency was in place as they believed this would make purchase easier and remove currency risk. They therefore delayed buying, so driving the price down temporarily. The other main determinants of house prices are more mixed in terms of the result. Only in the Netherlands, Ireland, Spain, UK and the USA is output a significant and positive determinant of house prices, whilst only Spain and Ireland have a significant and negative effect from interest rates. This last result reflects the greater importance of home ownership and mortgages in these countries relative to the other ones included in the study. Data permitting, the method employed here can be extended to new members of the Eurozone<sup>8</sup>.

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Another alternative would be to use microeconomic approaches, however again there was no suitable data on a micro level available.

<sup>8</sup> An attempt to quantify the size of the cash economy can be based on these estimates. Taking the Netherlands as an example, our estimates indicate an excess return of 7,000 Euros over the two quarters. With approximately 100,000 homes sold over this time period and assuming that all the excess return was used as a medium of

## 7. Corroborative Evidence on the ‘Cash Economy’

How do the results obtained here ‘fit’ with other evidence on the size of informal economies? The rankings for the cash economy effects from the results would be Ireland, Holland, France. Estimates of the informal economy are often used to proxy the relevance of tax evasion in different countries. When reviewing the OECD countries there is a stark contrast between the sizes of informal sectors.

The unfortunately named PIGS (Portugal, Italy, Greece and Spain) economies feature high on the rankings of informal sectors being 5<sup>th</sup>, 2<sup>nd</sup>, 1<sup>st</sup> and 4<sup>th</sup> respectively. Only Belgium breaks up a Southern European pattern. Do the results obtained appear to be consistent with this picture? Ireland, France and the Netherlands are neatly placed and somewhat supportively ranked 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> but the order for the Netherlands and France are reversed compared to the abnormal returns results. Spain as noted above is the ‘outlier’ result.

Torgler and Schneider (2007) use a tax morality variable from the World Values Survey in their study. The variable is based on responses to the general question: “Please tell me for each of the following statements whether you think it can always be justified, never be justified. Or something in between (...) Cheating on tax if you have the chance.” are coded into ranks ranging from 1 = Never justifiable to 10 = Always justifiable. This is essentially an attitudinal question relating to the morality of tax evasion as opposed to a behavioural one and can be construed as data on norm strength of tax honesty in various countries. There is an obvious problem in that only code 1 corresponds to complete honesty as regards tax paying while the remainder are increasing degrees of dishonesty. Table 2 provides two measures of country

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exchange, it implies about 14 million Euros were laundered. Assuming a M0 velocity of about 32, it suggests about 0.12% of annual GDP being in the cash economy.

dishonesty. The first is the sum of codes 2 to 10 – a stringent measure of dishonesty - and the second treats all respondents coded 1-5 as ‘honest’ (a sort of democratic 50% view of honesty!) leaving codes 6 to 10 as the dishonesty measure.

Here the evidence is less supportive. The rankings in the econometric results Ireland, Holland, France go to Holland, France, Ireland on Codes 2 to 10 and France, Holland, Ireland on Codes 6 to 10 however the scores do suggest a ‘closeness’ between France and Holland compared to Ireland. The fact that three of the PIGS economies rank 10<sup>th</sup>, 11<sup>th</sup> and 14<sup>th</sup> of the 15 may cause some eyebrows to be raised!

The illustrated method documented here produced a low figure for the cash economy as the certain underestimate (see footnote 8) of its size as it only considers one asset. Some recent evidence is however supportive. Takala and Viren (2010) confirm a figure for the shadow economy in Finland close to that of Nurminen (2008) with magnitudes of about 1.5% of GDP. These estimates contrast with the Schneider (2002, 2005) estimates of 15-25% of GDP and such a ‘gap’ is not easily explained. It may be relevant to note very marked differences in scale between estimated figures for the shadow economy as a whole (hidden activities) and illegal activities. Alm and Embaye (2013) use dynamic panel estimates to give measures of the size of shadow economies for 111 countries. For the Netherlands in 2006 the shadow economy is estimated at 14.8% of GDP. Kazemeir et. al. (2013) estimate that in 2008 the total contribution of illegal activities to the national income of the Netherlands was some 0.6% with a suggested error bound of plus or minus 0.3%. Around 40% of this total was drugs whereas illegal employment some 33%. Like many other countries the UK Office for National Statistics (ONS) has started to include illegal activities (drugs and prostitution) in the GDP accounts altering recent economic history (O’Connor, 2014).

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This allows a comparison with the Netherlands data. The Alm and Embaye (2013) shadow economy figure for the UK is 17.2% for 2006 while the ONS measures of illegal activities in 2009 were prostitution £5.3 bn and drugs £4.4 bn amounting to 0.7% of GDP. These, admittedly imperfect, estimates make the ratio of the illegal economy to shadow economy 0.04 in both the Netherlands and the UK. At first blush the estimate reported here seem broadly consistent with estimates of the share of illegal activities in GDP perhaps suggesting the housing market is an attraction to those wanting to launder the proceeds of illegal activities as opposed to tax evaders. However this is a conjecture awaiting further analysis not least because the ONS used some data from the Netherlands e.g. €0.50 a client on condoms in 2007.

## **8. Conclusions and Policy Implications**

An important concern for policy makers across the EU and many other industrialised economies is how to raise more tax revenue to bring their budget deficits under control and in this study we find evidence that the ‘cash economy’ is a significant problem within the EU and a potential source of large amounts of extra tax. We model it from a theoretical and empirical standpoint using property prices in conjunction with the move to the European single currency in 1999. Using a dummy variable between the announcement of the Euro’s members and the implementation of the Euro, we find it has a significant effect for all the members of the Euro except Spain. As a control we have also used countries that are not part of the Euro and find in all cases the effect is not significant.

Smith (1986:108) claims that “Estimates of the size of the black economy based on cash indicators are best ignored.” Whist the empirical work reported here is not all conquering the exercise does offer a measure of support for the theoretical

speculations in Section 3 and is based on this behaviour. In a way the credible announcement to join the Euro enacted a recommendation made by Henry (1976). He noted the growth in demand for large denomination dollar bills and advocated periodic recalling of such bills to prevent ‘tainted’ cash being held in this way. Those dealing in the cash economy would need to justify their holdings of large amounts of cash in high denomination bills in order to have an equivalent amount of cash returned to them in new bills. The idea was to throw gravel in the wheels of the cash economy.

The investigation discussed above does not share some of the weaknesses associated with earlier cash based estimates of the shadow economy. It does not rely on the convenience of large denomination notes<sup>9</sup>. It does not require a base year where the shadow economy was believed to be near zero or an official estimate was deemed accurate. It avoids use of a cash deposit ratio and in attempting to isolate the cash as opposed to the irregular economy it accepts wholeheartedly Thomas’ (1992: 149) comment: “While it may be plausible to assume that cash is the sole medium of exchange for people working in the irregular sector, this is even more likely to be true for anyone operating in the criminal sector.” It seems “Pinning down the informal economy is as tough as catching a fake Louis Vitton vendor running from the police” (Barnes, 2009). Given this degree of difficulty the impression of the cash economy glimpsed above may have merit. For a specialist housing economist, familiar with the data and institutional structure of their economy furnishing a more precise calculation

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<sup>9</sup> In this respect it is interesting to note that Professor Willem Buiter claims that the high denomination euro bank notes (200 and 500 bills) are “making the euro the currency of choice for underground and black economies ...” and that Feige (2012) reports how the US fraction of the money stock made up of \$100 bills grew from 20.9% in 1963 to 73.3% in 2008.



would seem, on this evidence, a worthwhile task. If other ‘launderable’ assets are identified and measured then the methodology proposed here can be improved.

### **Acknowledgements**

An early version of this paper was presented at the conference ‘The Shadow Economy, Tax Evasion and Money Laundering’ at the Munster School of Business Administration and Economics, University of Munster, Germany in July 2011. The authors are very grateful for comments received then and those of two anonymous journal referees. The usual disclaimer applies.

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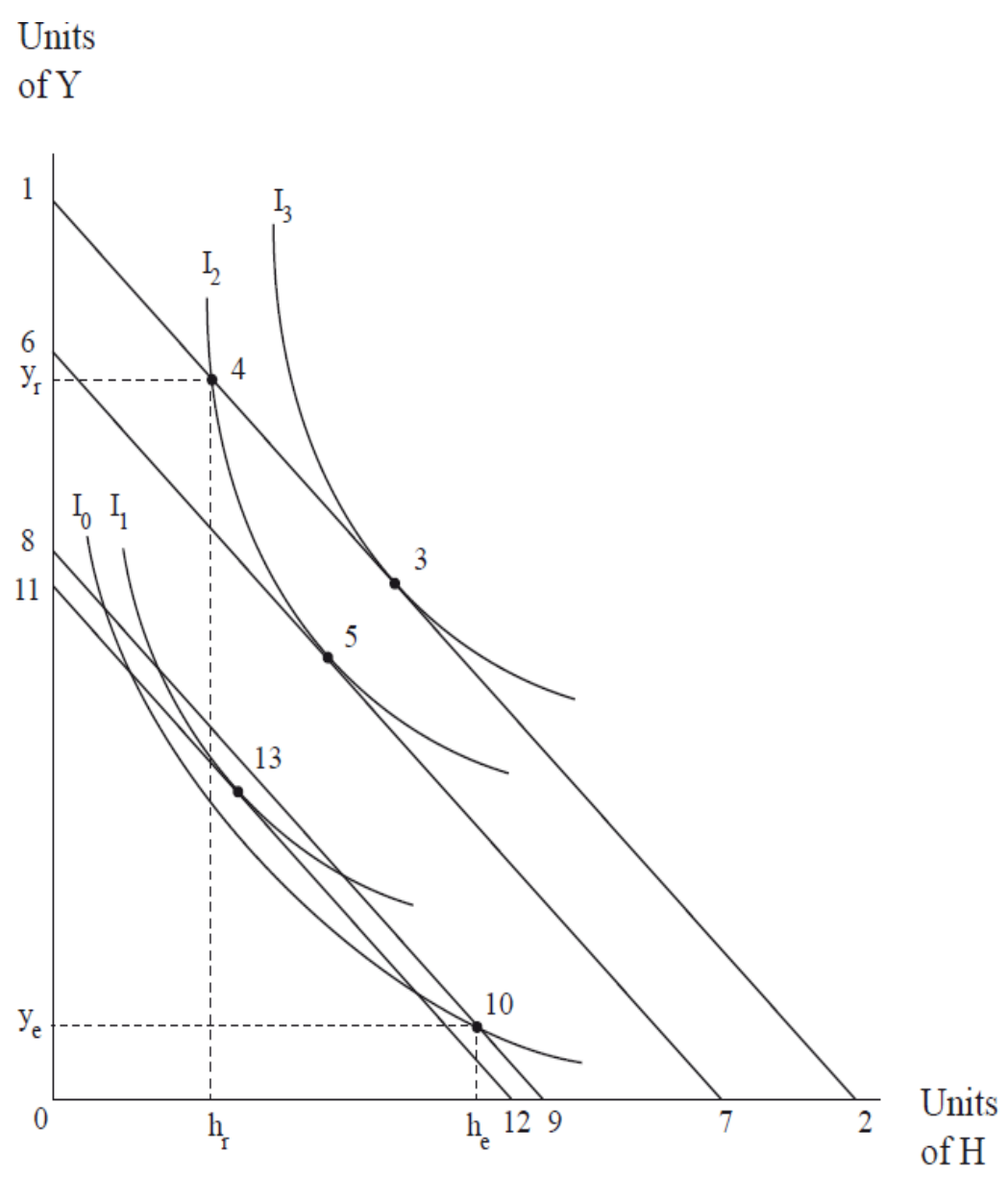
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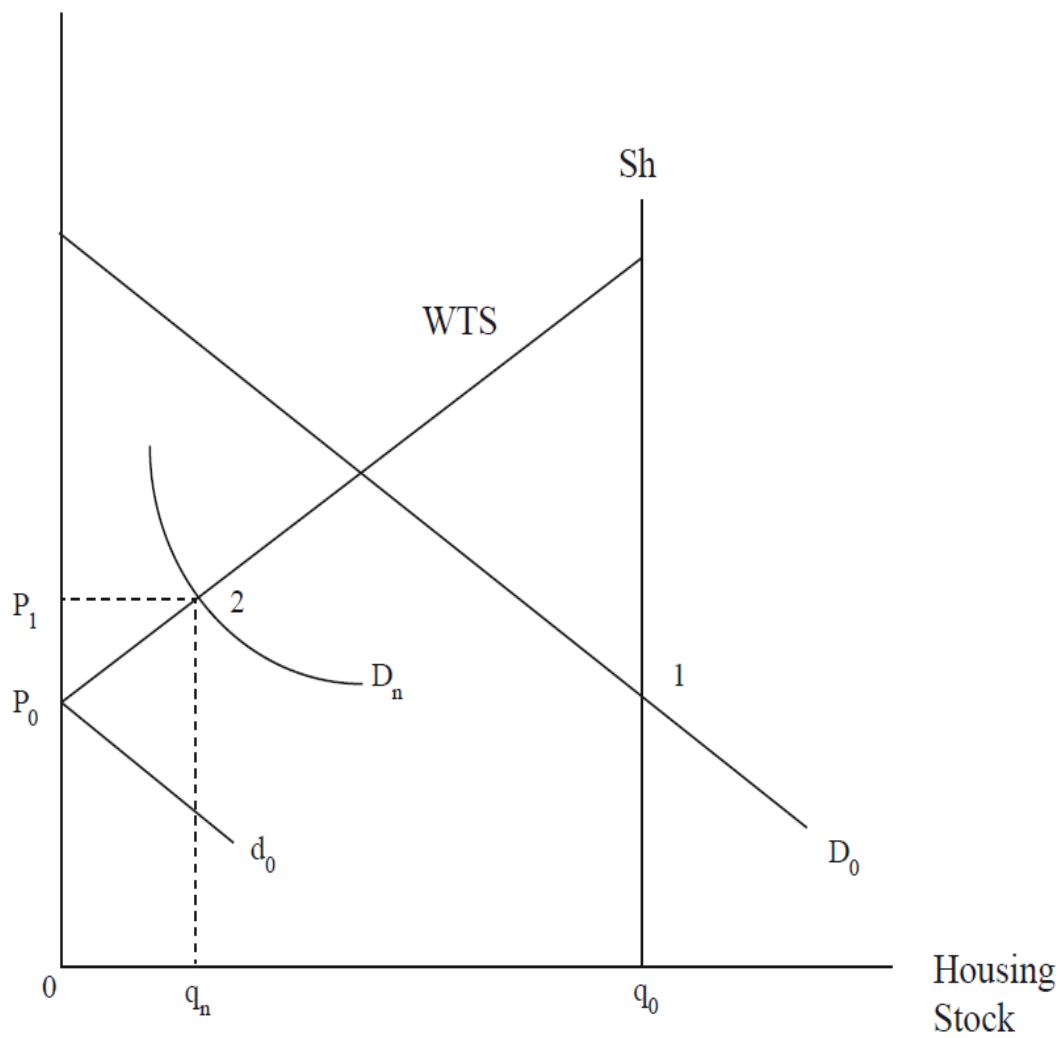
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**Figure 1. Individual Adjustment to an Announcement Effect**



**Figure 2. Housing Market Adjustment to an Announcement Effect**

Asset Price  
of Housing





**Table 1. Results from house price return model**

Country	Constant	$\Delta ip$	I	Dummy	Adj-R <sup>2</sup>
France	-0.004 (1.641)	0.010 (0.122)	0.004 (0.076)	0.006* (5.555)	0.02
Holland	0.005 (0.519)	0.270* (1.990)	0.080 (0.485)	0.019* (3.785)	0.03
Ireland	0.027* (2.576)	0.187** (1.882)	-0.156** (1.682)	0.045* (7.411)	0.08
Spain	0.015** (1.854)	1.321* (3.110)	-0.255* (2.468)	-0.029* (3.124)	0.27
Sweden	0.021* (2.495)	-0.002 (0.089)	-0.133 (0.995)	-0.017 (1.015)	0.00
UK	0.024* (2.272)	0.429* (3.281)	-0.153 (1.268)	-0.005 (0.832)	0.21
USA	0.003 (0.665)	0.414* (3.361)	-0.033 (0.453)	0.001 (0.537)	0.08

Notes: All models include HAC standard errors and covariances (Newey-West

adjustment).A \* (\*\*) indicates significance at the 5% (10%) level.

**Table 2 The ‘norm’ of dishonesty in 15 OECD – West European Countries  
different countries in 1999**

Country	Codes 2 to 10	Rank	Codes 6 to 10	Rank
Austria	41.4	12	8.4	13
Belgium	61.3	1	24.7	1
Denmark	34.4	15	5.6	14
Germany	59.2	2	18.3	2
Finland	44.8	8	12.9	4
France	50.3	5	17.2	3
GB	43.9	9	9.8	9
Ireland	41.1	13	8.5	11=
Italy	42.7	11	9.7	10
Netherlands	53.7	3	12.6	5
Norway	52.1	4	12.2	7
Portugal	43.5	10	11.7	8
Spain	35.9	14	4.3	15
Sweden	49.1	6	8.5	11=
Switzerland	45.4	7	12.3	6

Source: World Values Survey.

## Appendix

**Table A1. House Price Index Sources**

Country	Source
France	House Price Index from the National Institute for Statistics and Economic Studies
Netherlands	House price Index from the NVM
Ireland	House price Index supplied by the Economic and Social Research Institute
Spain	House price Index by the Banco de Espana
Sweden	House price Index from Statistics Sweden
UK	Financial Times House Price Index from the FT Case-Shiller House Price Index by S&P.

USA	
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