It's Prices, Stupid: Explaining falling crime in the UK

Global Perspectives Series: Paper 6

MIRKO DRACA

February 2016

SUMMARY

- Crime has fallen across many countries since the early 1990s. A range of explanations have been put forward, including the level of police resources, the incidence of drug epidemics, demographic factors (including the effects of abortion and lead pollution on the crime propensity of different age cohorts), and incarceration rates.

- Another plausible explanation for changes in the rate of property crime, though one that has received far less attention, is prices. As the prices of commonly stolen goods change then so does the return to property crime.

- This briefing paper puts forward comprehensive evidence on prices and crime for a large range of goods, focusing on monthly data for London over 2002-2012. We find that crime is responsive to prices across the large range of goods we study with elasticities in the region of 0.35-0.40. This indicates that, for example, a 10% increase in prices is associated with a 3.5% increase in crime.

- We further analyse a sub-set of commodity-related goods - jewellery, fuel and metals. These goods offer a clean quasi-experimental setting to look at the effects of a pure change in price on criminal activity. Specifically, they are homogenous in their quality and supported by efficient resale markets (for example, the scrap metal recycling industry). Price changes for these goods are also exogenous since they are driven by trends in international commodity prices.

- Practically, these conditions mean that price changes are unlikely to be driven by local UK economic patterns that could also be influencing crime through other channels. Overall, this further analysis confirms the existence of a significant, causal crime-price relationship, especially for metals where there was a price-induced crime boom in the mid-to-late 2000s.

- We also compare the effect of a 'stolen goods price index' on crime to the effect of changes in wages. We find that the index tracks aggregate crime more closely

than wages; and that over 20% of the trend fall in crime can be explained by prices at the aggregate level.

- A crucial policy implication of this analysis is that, since the returns to crime matter so significantly, **investments in security** have potentially more leverage in reducing crime than previously thought. For example, the spread of technologies that aid device security (e.g. tracking devices such as 'find my iphone') have the effect of lowering the net returns to theft. Provided that criminals find it difficult or costly to adapt to and overcome such technologies, investments in security have the potential to kill off the incentives for theft.

- Another policy implication relates to **'predictive policing'**. Since crime tracks the value of goods so tightly it would be viable to begin planning police responses to theft as market prices start to rise or fall. For example, increases in metals or other commodity prices could be used as a signal to increase monitoring or patrols relating to the potential theft of these goods.

ABOUT THE SERIES

CAGE and Social Market Foundation (SMF) policy briefings in the *Global Perspectives Series* are non-technical summaries of one or more academic research papers intended for distribution among policy makers and journalists. They are available to the public on the CAGE and SMF websites. Policy briefings are not intended as independent scholarly publications. When referring to the results described here, please cite the original academic papers, if possible in their latest or published version, as insights may have changed as research progressed.

ABOUT THE AUTHOR

Mirko Draca is an Assistant Professor in the Department of Economics at Warwick University. He is a research associate of Warwick's ESRC Centre on Competitive Advantage in the Global Economy (CAGE) and a Research Associate at the Centre for Economic Performance (CEP) at the London School of Economics. He obtained his PhD at University College London and worked at CEP prior to joining Warwick. Other affiliations have included the Edmond J Safra Center for Ethics at Harvard University, where he participated in the 'Institutional Corruption' research programme. Most recently, he has published on topics including the economics of crime, the minimum wage, and the 'revolving door' in journals including the American Economic Review and the American Economic Journal: Applied Economics.

ABOUT CAGE

Established in January 2010, CAGE is a research centre in the Department of Economics at the University of Warwick. CAGE is carrying out a ten year programme of innovative research. The centre's research programme is focused on how countries succeed in achieving key economic objectives such as improving living standards, raising productivity, and maintaining international competitiveness, which are central to the economic wellbeing of their citizens. Our research analyses the reasons for economic outcomes both in developed economies like the UK and emerging economies such as China and India. We aim to develop a better understanding of how to promote institutions and policies which are conducive to successful economic performance and endeavour to draw lessons for policy makers from economic history as well as the contemporary world. Research at CAGE examines how and why different countries achieve economic success. CAGE defines 'success' in terms of well-being as well as productivity. The research uses economic analysis to address real-world policy issues. The centre is distinctive in providing a perspective that draws on economic history as well as economic theory and is applied to countries at various different stages of economic development. www.warwick.ac.uk/cage

ABOUT THE SOCIAL MARKET FOUNDATION

The Social Market Foundation is a non-partisan think tank. We believe that fair markets, complemented by open public services, increase prosperity and help people to live well. We conduct research and run events looking at a wide range of economic and social policy areas, focusing on economic prosperity, public services and consumer markets. The SMF is resolutely independent, and the range of backgrounds and opinions among our staff, trustees and advisory board reflects this. www.smf.co.uk

IT'S PRICES, STUPID: EXPLANING FALLING CRIME IN THE UK

INTRODUCTION

Crime rates have fallen in many countries since the early 1990s. It has been hard to pinpoint a decisive reason for this fall in crime with factors such as investments in police, changes in incarceration rates and demographic factors such as abortion and even the level of lead pollution all having been considered.

In this briefing paper I tackle a surprisingly overlooked reason for the fall in property crime – the price of goods. Simply put, the price of goods is a major determinant of the potential gains from property crime. Changes in these prices are therefore key incentives for the decision to participate in crime. Systematic changes in the prices for commonly stolen goods could therefore feed through to drive trends in the aggregate rate of property crime.

My main focus is the presentation of some recent evidence from Draca, Koutmeridis and Machin (2015) (hereafter DKM(2015)), which studies crime and prices in the context of a large dataset that gives the product-level breakdown of items stolen in London from 2002-2012. This evidence establishes that changes in crime and prices are correlated for many different goods. It is further clear from a special sub-group of commodity-related goods (which offer the best experimental conditions for studying prices and crime) that the crime-price relationship is strong and characterized by rapid adjustment. Finally, mapping onto aggregate property crime rates indicates that prices explain a substantial part of the trend over the 2002-2012 period. In total, while our data covers one city over one decade, this evidence is compelling enough to suggest that prices deserve serious further investigation as the potential main determinant of the major shifts in property crime that have occurred across countries since the 1990s.

This briefing first provides a review of the international data on crime rates, along with a discussion of possible explanations. I then address the evidence for the detailed London data, focusing firstly on a broad set of (mostly) consumer goods and then a subset of commodity-related goods (metals, fuel, and jewellery) where unique conditions exist for studying the causal relationship between prices and crime.

FALLING CRIME ACROSS COUNTRIES

Figure 1 plots crime rates since 1970 for the US and Europe, as assembled by Buonanno, Drago, Galbiatti, and Zanella (2011) (hereafter BDGZ (2011)). The first panel (a) shows total crime rates (property crime plus violent crime), indicating a so-called 'reversal of misfortune' for Europe whereby crime rates started increasing just as the US crime drop began in the early 1990s. However, the breakdown by types of crime shows that this was driven by a surge in violent crime (panel (c)). Whereas property crime, as shown in panel (b) fell in both Europe and the US from 1990 when it was at a level of around 50 incidents per 1000 people.

Discussions of the drop in crime by contributors such as Levitt (2004) and BDGZ (2011) effectively group the reasons for the fall into two categories. First are the 'opportunity cost' factors such as police numbers, incarceration, wages and unemployment. These factors either directly affect the cost of committing a crime (e.g. incarceration) or the value of foregone opportunities (e.g. wages that could be earned from legal sector employment). Briefly put, these are the factors that directly bear on the *incentives* for criminal participation.

Figure 1a: Crime rates in Europe and the USA – total crime (per 1,000 of population)

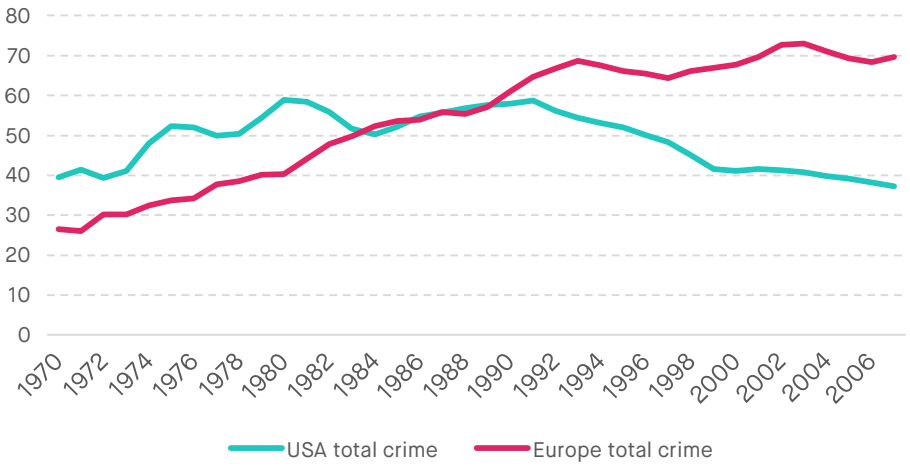


Figure 1b: Crime rates in Europe and the USA – property crime (per 1,000 of population)

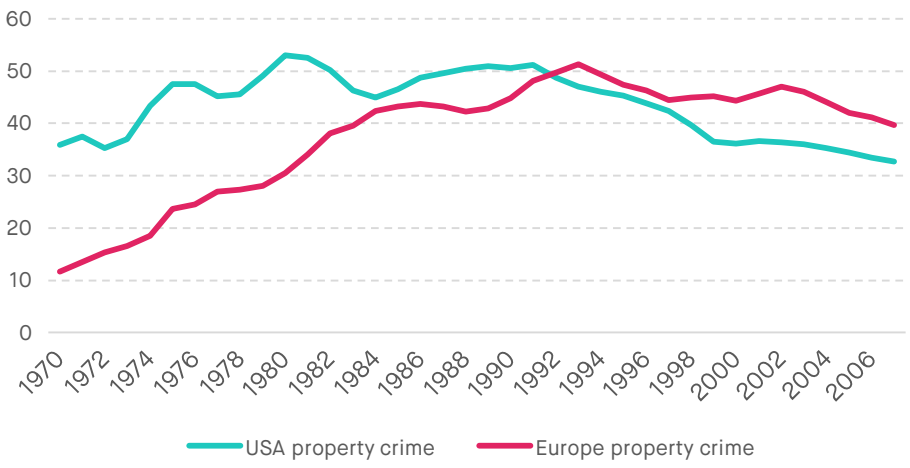
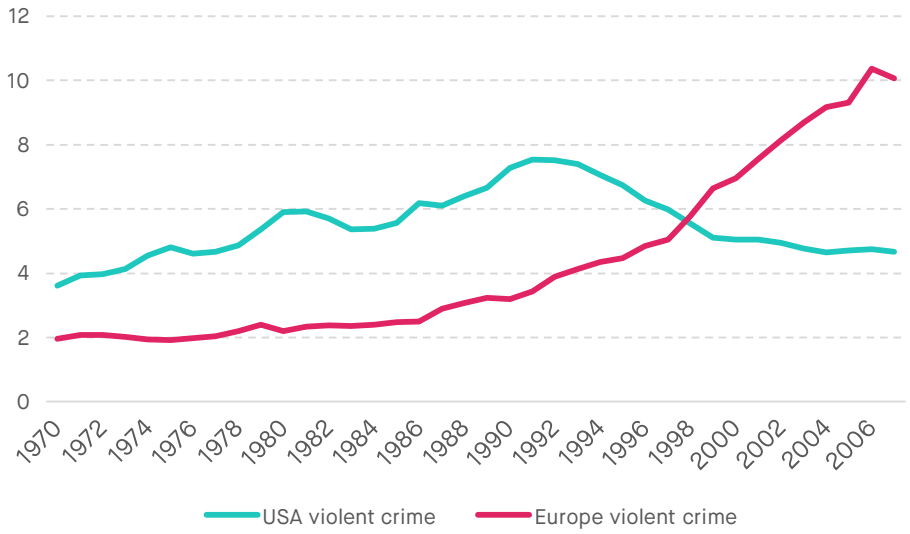


Figure 1c: Crime rates in Europe and the USA – violent crime (per 1,000 of population)



Source: Buanano et al (2011)

The second set of factors are demographic and, in effect, relate to the *supply* of criminals. For example, the size of the young male cohort of the population has a bearing on crime because this sub-group has the highest propensity to engage in crime. Similarly, Donohue and Levitt (2001) first outlined the argument that abortion could influence the crime rate by reducing the size of cohorts in social risk-groups such as single parent families. Another argument along these demographic lines relates to environmental lead exposure, which is known to be associated with health and behavioral problems that could lead to criminal participation. Wolpaw-Reyes (2007) uses variation in the phasing out of lead in petrol across the US to estimate the possible effects, with a significant link evident for violent crime but not property crime.

Levitt's (2004) overview suggests a combination of factors is most likely responsible for the fall in crime. For the case of the US he argues that the major explanations lie in the combined effects of increased incarceration rates, the tempering of the 1980s crack epidemic, and the legalisation of abortion. However, a big analytical issue remains when it comes to extrapolating this for other countries. The discussion in BDGZ(2011) points out that incarceration represents the single biggest difference in crime control policy when comparing the European and US experiences. Specifically, the US incarceration rate has risen from being around three times higher than the European rate in the 1970s to being seven times higher in the early 2010s.

Given that Levitt (2004) attributes powerful effects to incarceration as a mechanism for reducing crime, it is plausible that differences in this particular policy explain the divergence in rates of violent crime between Europe and the US. However, this creates a puzzle for property crime since we would expect the deterrence and incapacitation mechanisms behind the incarceration effect to have similar effects on property crime. That is to say, all else being equal, if this theory is correct then the relatively tougher incarceration policies should have induced property crime to fall *even more* in the US

over this period. In contrast, the data indicates a very close, parallel tracking of property crime across the Atlantic, especially since the early 1990s.

The focus of this briefing is therefore motivated in part by this trend in property crime. The determinants of the internal rate of return to crime (i.e. the actual financial gains from criminal activity) have been severely under-studied, mainly due to the inherent problem of measuring illicit income (Draca and Machin 2015). Since re-sale activity ('fencing' as it is popularly known) is such a critical part of the incentive for property crime the price of goods can tell us about how much can be gained from property crime. There have been some useful case studies of price-crime relationships for particular goods (Reilly and Witt 2008; Sidebottom et al 2011; Wellsmith and Burrell 2005) but systematic studies across many items are (to my knowledge) unknown in the economics literature.

Furthermore, prices are potentially relevant to studying aggregate crime rates because, while crime control policies like incarceration can vary greatly across countries, international trade ensures that there is a common pattern of price changes occurring around the world. Hence, it is plausible that goods prices could be driving common shifts in the return to crime across countries, which in turn could explain parallel trends in property crime.

PRICES AND PROPERTY CRIME TRENDS IN LONDON

To look at this, firstly, we have made a comprehensive study of a large number of mainly consumer goods that make up the typical 'target items' in the average burglary or theft incident. Secondly, there is a case study of the crime-price relationship for commodity-related goods (metals, jewellery and fuel). As I will explain, this case study serves as a useful 'natural experiment' in the sense that it gives us the cleanest conditions available for analysing how criminals respond to a pure change in the value of goods. Finally, I discuss how this evidence stacks up in terms of explaining property crime trends in London over the period from 2002-2012.

Table 1: London Metropolitan Police Crime Recording Information System (CRIS), 2002-2012

(1)	(2)	(3)	(4)	(5)	(6)
One Digit Code	**Description**	**Number of Two Digit Products**	**Share of Total Crime (Full Period)**	**Share of Total Crime (2002)**	**Share of Total Crime (2012)**
A	Clothing	10	0.036	0.040	0.034
B	Publications	4	0.003	0.004	0.002
C	Currency and Official Documents	13	0.261	0.288	0.210
D	Cosmetics and Drugs	4	0.017	0.172	0.015
E	Electronic and Electrical	21	0.194	0.191	0.232
F	Weapons	5	0.001	0.001	0.000
G	Food and Drink (inc Alcohol)	7	0.024	0.024	0.026
H	Furnishing & Household Accessories	22	0.018	0.026	0.012
J	Jewellery	10	0.060	0.055	0.083
K	Personal Bags and Cases	8	0.101	0.107	0.086
L	Leisure Equipment / Vehicle Accessories	19	0.056	0.038	0.072
M	Metal Commodities	7	0.003	0.001	0.006
N	Personal and Vehicle Documents	12	0.091	0.089	0.080
P	Office and Art Materials	8	0.004	0.005	0.003
R	Building Materials	16	0.002	0.001	0.002
S	Photographic and Scientific Equipment	5	0.030	0.029	0.024
T	Building Tools	10	0.030	0.037	0.036
V	Pets and Animals	7	0.000	0.000	0.000
W	Public Property, Fuel and Miscellaneous	15	0.071	0.050	0.078
	Overall Statistics				
	(a) Share Matched (balanced panel)		0.368		
	(b) Share Non-Matched (unbalanced)		0.108		
	(c) Share Rare / Unusual		0.033		
	(d) Share Non-Market		0.492		

The data

The data used for this analysis is derived from a database that matches information from the London Metropolitan Police (LMP) crime reporting system to Office of National Statistics (ONS) data on retail prices. A unique feature of the LMP data is the 2-digit product code used for reporting the thefts of different stolen items as part of overall incident reports. This allows us to construct total counts of stolen items by product type across all of London. This information on property crime counts is then matched to the ONS price information by studying the label descriptions of each category, pooling across the detailed codes where necessary to get a match. The result is a panel of 44 goods for which we have data at the monthly level, observed from 2002-2012.

Table 1 reports information on this panel. The first thing to note is the composition of crime. Approximately half (49.2%) of the items stolen as part of London criminal incidents can be classified as 'non-market goods' with no direct price series available. These are items such as passports, documents and credit cards that are not traded directly as priced goods. The remaining half are the commercially priced 'market goods' that are familiar from anecdotal accounts of burglaries and thefts. The biggest categories here are electronic and electrical goods (19.4% of all items stolen) and jewellery (6% of all items stolen).

Table 2 then shows a breakdown of the biggest individual increases and decreases in theft rates across 2-digit goods in this 'market good' category. Note that this is basically a breakdown of the goods within the 50.8% of items stolen that are *not* 'non-market goods' such as passports, documents and credit cards. Mobile phones and bicycles experience large increases in theft during the 2002-2012 period with final shares in the total count of stolen items of 31.6% and 8.8% respectively. Major increases across a range of jewellery sub-categories are also very noticeable. Amongst the goods that have experienced falls in shares are what can be thought of as 'likely suspects': audio equipment, recorded media (CDs, DVDs) and visual electronic goods (TVs, DVD players). This is reflective of the common intuition that these goods have become much less valuable in the past decade as imports from countries such as China have lowered prices very sharply.

Table 2a: Changes in property crime shares, top 10 out of 44 matched goods (2002-12)

PROPERTY TYPE CODE	PROPERTY TYPE DESCRIPTION	10-YEAR CHANGE IN SHARE (%)	FINAL SHARE IN 2012 (%)
ET	Mobile Phones	8.8	31.6
LA	Bicycles and Accessories	4.6	8.8
JA	Necklace / Pendant	1.9	5.1
JC	Watch	1.3	4.2
JB	Ring	1.0	4.3
JD	Bracelets	1.0	2.9
JE	Earrings	0.5	1.9
TA	Hand Tool – Power	0.5	5.9
GA	Foodstuff	0.3	1.7
ER	Battery / Charger	0.2	0.4

Table 2b: Changes in property crime shares, bottom 10 out of 44 matched goods (2002-12)

PROPERTY TYPE CODE	PROPERTY TYPE DESCRIPTION	10-YEAR CHANGE IN SHARE (%)	FINAL SHARE IN 2012 (%)
EA	Audio/Radio/Hi-Fi/CD	-8.5	2.8
HA	Records/CDs/Tapes/DVDs	-2.9	0.6
EB	TV/Video/DVD/Projectors	-1.9	2.3
SB	Optical Equipment	-1.0	1.8
TB	Hand Tool – Mechanical	-0.8	1.0
AA	Ladieswear	-0.6	2.6
GD	Drink – Alcoholic	-0.6	2.2
DA	Cosmetics / Drugs	-0.6	3.3
AB	Menswear	-0.5	3.3
AD	Toiletries	-0.5	0.5

Note: This Table reports property type codes and names in the matched, balanced panel (2002-2012) of MPS data that have experienced the ten highest and ten lowest increases in their share of total crime (the sum of burglaries, robberies and thefts).

The data presented in Table 2 is clearly very suggestive of some type of link between prices and crime. The question for empirical research is whether this intuition stands up to formal analysis. How strong is the relationship across goods and could some other confounding factor be behind what we see in the basic data?

Results for 'market goods'

There are a number of concerns that come into play when considering the relationship between prices and crime. One that is specific to this application is *measurement.* We use on-the-shelf retail prices to proxy for the changing value of goods when the underlying object of interest is actually *potential re-sale value* for criminals. Furthermore, it could be that prices are capturing the effects of other goods characteristics. These *non-price characteristics* could be factors such as the size, weight or current supply of the good in the population. In turn these factors could be changing along with prices and be the real drivers of changing crime. Finally, we have to bear in mind the *role of security*. As goods become more valuable there is a natural incentive to invest in security to protect goods. If such an investment pattern was strong, fast and systematic it could seriously dampen the link between prices and crime.

In brief, the approach taken in DKM (2015) deals with these concerns by analyzing the data in terms of *changes*. That is, changes in prices per good are related to changes in crime per good. The key advantage of this approach is that it 'differences out' the fixed or slowly changing characteristics of goods. By looking at the data in changes we can effectively remove from our analysis the fact that garden furniture is heavier (and therefore harder to steal) than DVD players. For this to work, an important requirement

is that prices adjust faster than the non-price characteristics of goods. This is plausible *ex ante*, and is also borne out strongly in the data.[1]

Figure 2a summarises the main results of this modelling. It shows the estimates of the relationship between crime and prices for the 44 goods in the matched London data over the 2002-2012 period. The estimate of 0.346 implies that a 10% increase in prices is associated with an approximate 3.5% increase in the count of stolen items for a given good. The next two columns break this down according to crime type, with higher estimates for theft (0.413) than for pooled Burglary/Robbery (0.254). In the next step, we study the lag structure associated with this relationship. This is important for understanding the speed of adjustment, that is, how quickly crime responds after a change in prices.

Figure 2a: Crime and Prices – Estimates for 44-Good Model (2002-2012): Baseline Estimates – Total Crime and by Crime Type

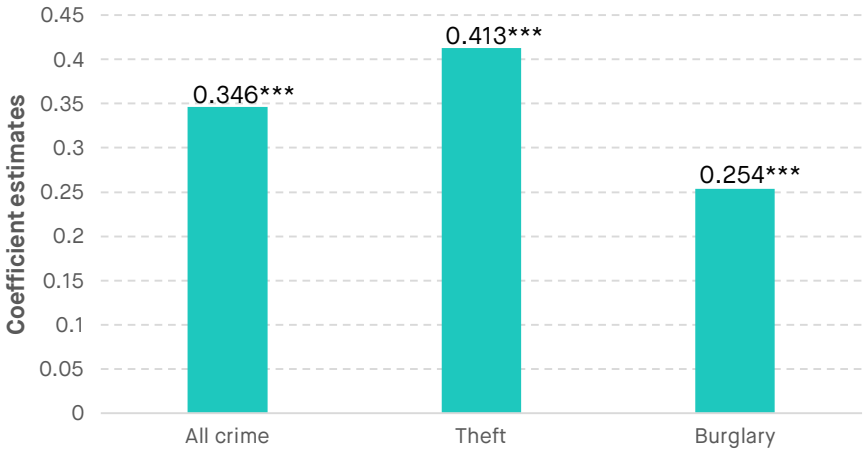
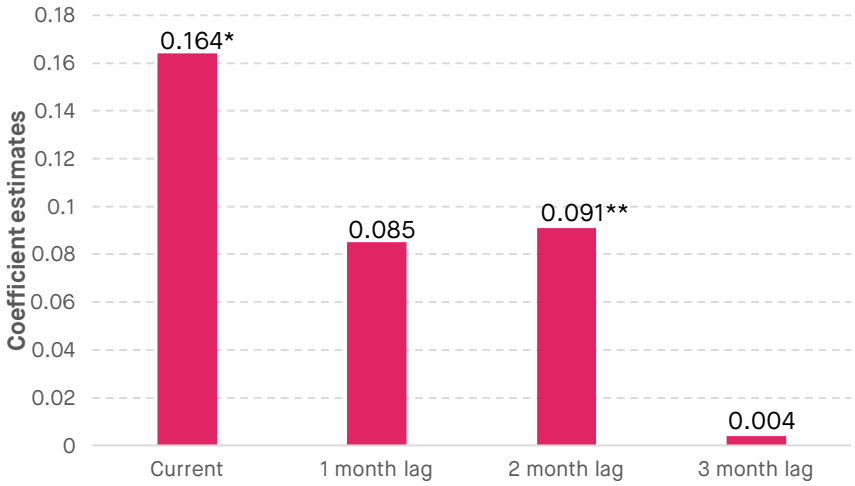


Figure 2b: Crime and Prices – Estimates for 44-Good Model (2002-2012): Lag Structure Estimates (Total Crime)



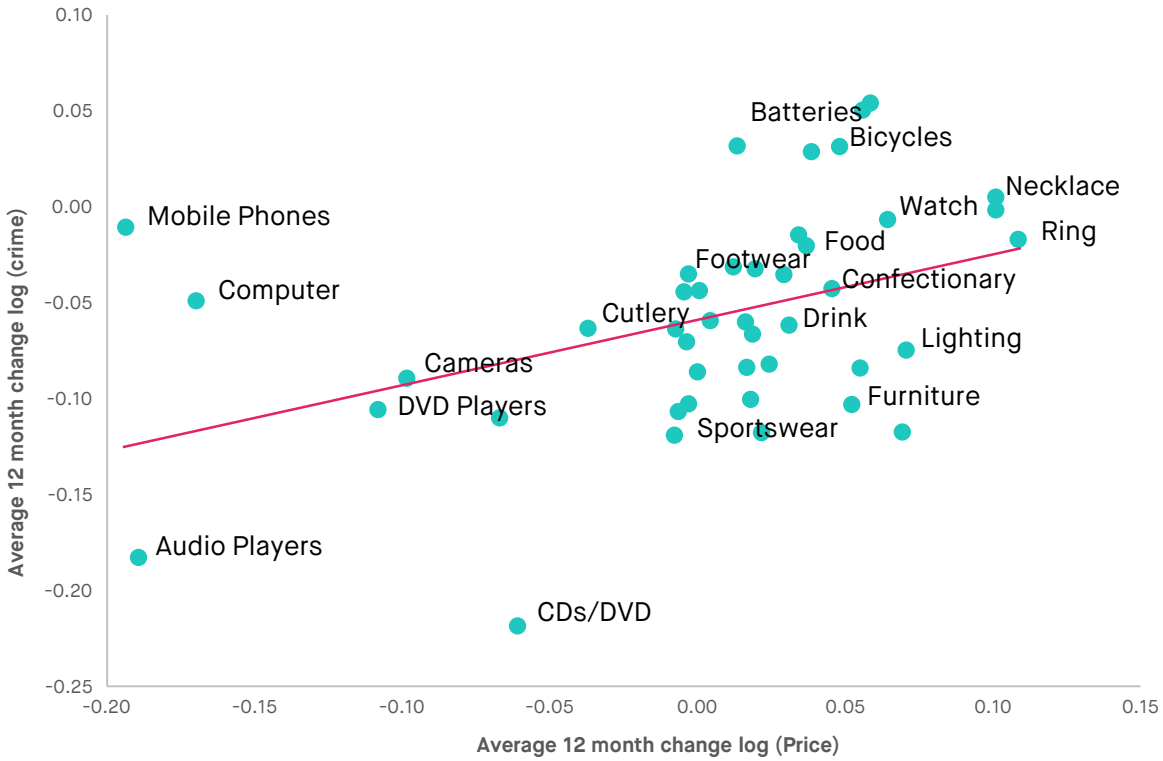
[1] Furthermore, note that this differencing out approach helps in terms of the measurement problem discussed above. If we assume that that the depreciation factor or 'markdown' between the price a new good and a second hand good is slowly changing over time then the variation in markdowns across goods will be absorbed by our differencing out.

*Note: Bars represent coefficient estimates from regression models of crime and prices (with prices measured in terms of a price index per good where baseline value equals 100 in January 2002). Panel (b) shows estimates for a model of total crime with contemporaneous prices and three months of lags. *** denotes 1% significance, ** 5 % and * denotes 10%. Specifications include month-good fixed effects and time effects for all periods. For full details of specifications, see Draca, Koutmeridis and Machin (2015).*

Figure 2b reports the results of a model where we directly allow for up to three months of lagged effects for prices in addition to the contemporaneous effect. The results for this indicate that the effect of prices unfolds quickly – there are no significant effects by the third month such that most of the adjustment occurs in the very short-run. This is encouraging in terms of the assumption we need for the 'differencing out' approach to do its work, namely than prices adjust faster than non-price factors.

Overall, these results indicate a clear link between prices and property crime rates across a broad range of mainly consumer goods. These goods represent the principal 'target items' that are stolen as part of the average burglary or theft incident. A visual depiction of the price-crime relationship in our data is given in Figure 3 which plots the average 12-month changes in price and crime over the sample period. This again shows the pattern of price-crime changes evident in Table 2, with clear rises for the jewellery categories and falls for Audio and DVD players.

Figure 3: Average 12-Month Changes in Log (Crime) and Log(Prices) For Matched MPS Panel (2002-2012)



Note: Average 12-month change over ten years in log(crimes) and log(price) per good across all 44 consumer goods panel. Some labels (mostly on relatively small crime categories) have been omitted for space reasons.

A natural experiment using commodity related goods

The evidence presented in Figures 2a and 2b show that a strong relationship between prices and crime exists across goods. Furthermore, the fact that the pattern of adjustment is dominated by a short-run response gives confidence that confounding factors have a very limited role to play. The conditions that exist when it comes to considering commodity-related goods – fuel, jewellery and metals such as copper and lead – also provide a unique setting to study how criminals respond to prices in more detail.

The main advantage of these commodity-related goods lies in their homogeneity. Fuel, metals and jewellery (when melted down) are goods that are constant in their quality over time – they are not subject to the regular cycle of upgrading and obsolescence we see for example in the case of electronic goods. They are also traded in well-established secondary markets (e.g. the scrap metal industry) where direct resale prices are reported. Finally, these resale prices are driven to a large degree by changes in international commodity prices rather than domestic market conditions. In summary, these factors combine to give us a sound 'natural experiment' such that we can consider the effects of the change in the value of a good on criminal incentives without any of the contamination that might occur because goods are changing in their quality or because prices are measured with error.

Figure 4 plots the changes in prices for these commodities against the changes in crime. This shows a very high degree of correlation and period-by-period tracking between criminal activity and the value of these commodities. A feature of this period was a boom in metals prices due to demand to China; and this boom led directly to a crime wave in metal theft.

Figure 4a: 12-month changes in crime and prices, Jewellery (2003-2012)

Figure 4b: 12-month changes in crime and prices, Fuel (2006-2012)

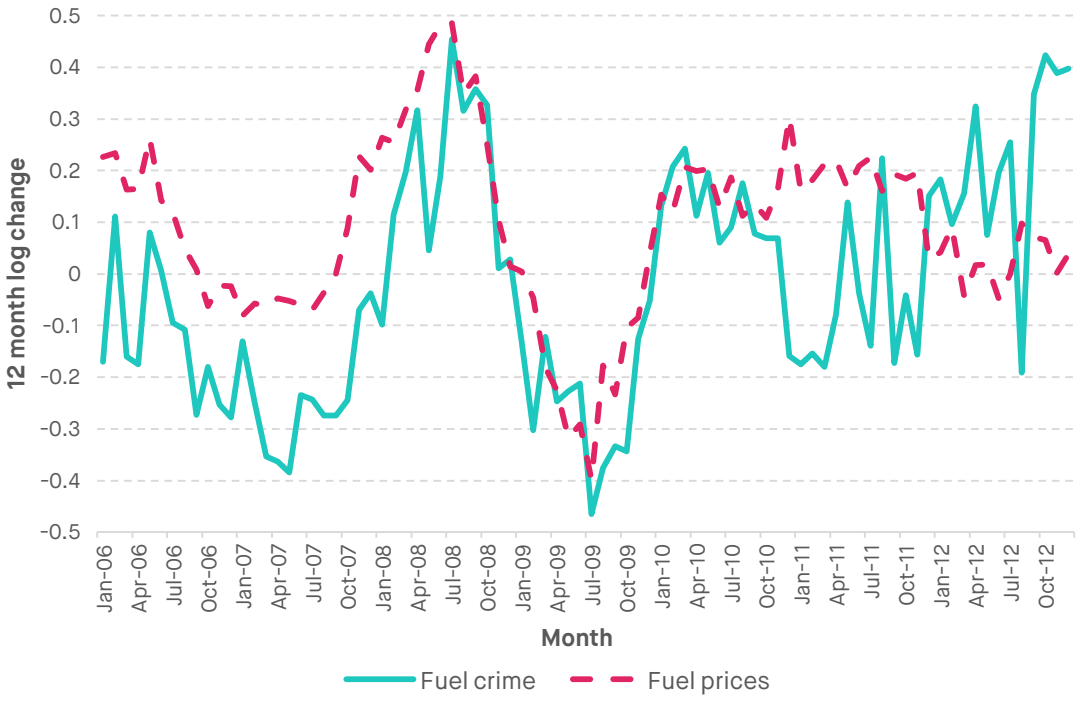


Figure 4c: 12-month changes in crime and prices, Metal (2003-2012)

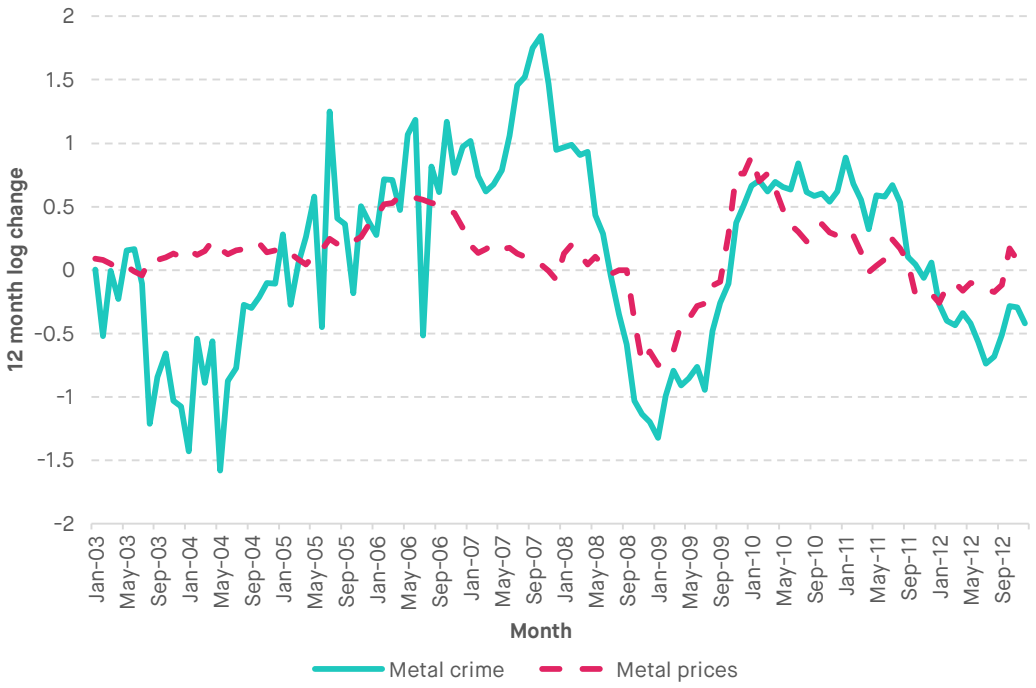
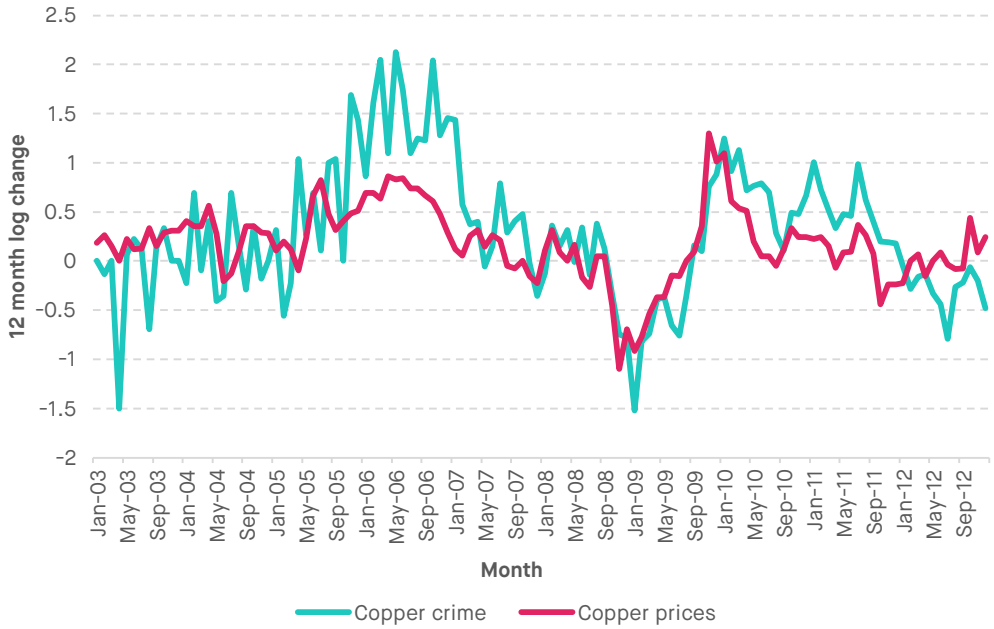
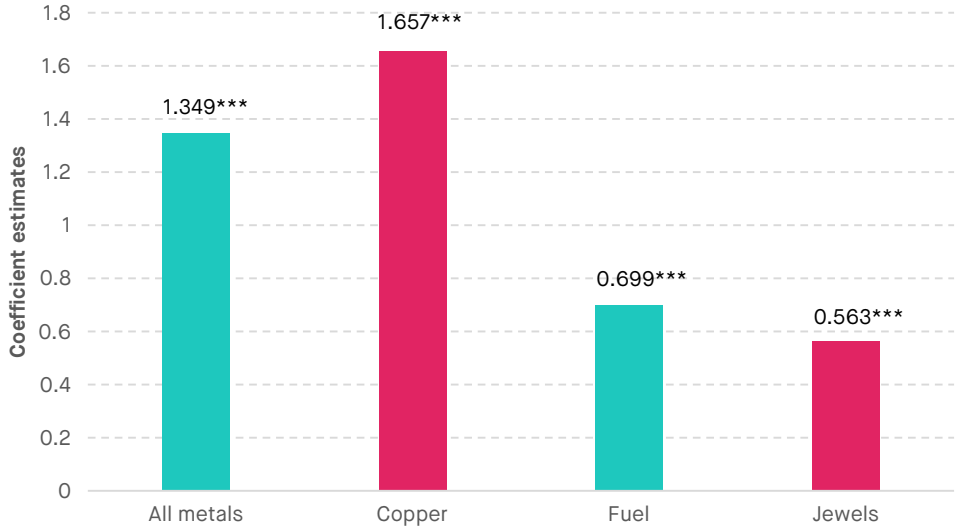


Figure 4d: 12-month changes in crime and prices, Copper (2003-2012)



The elasticity estimates relating to these plots are reported in Figure 5. These results are indicative of higher elasticities (compared to the 'market goods' panel) in the region of 0.5-0.6 for jewellery and fuel and above 1 for metals. The important of these results lies in the fact that the clean, quasi-experimental setting gives us the best possible insight into how criminals respond to a change in incentives at a large scale.

Figure 5: Crime and prices – estimates for commodity-related goods



*Note: Bars represent coefficient estimates from regression models of crime and prices (with prices measured in terms of a scrap metal or ONS product price index per good where baseline value equals 100 in January 2002). OLS estimates – see DKM (2015) for details of instrumental variable estimates using world commodity prices. *** denotes 1% significance, ** 5 % and * denotes 10%.*

Given this apparent high degree of sensitivity to prices on the part of criminals it is therefore important to ask what are the aggregate implications of changing prices across goods. How has the average value of property theft changed over time and does this clearly relate to trends in crime?

Explaining trends (2002-2012)

To think about trends, we return to the market goods panel, which represents the majority of all goods stolen in London, leaving aside items that are not formally priced such as passports, documents and credit cards ('non-market goods'). In order to build the aggregate picture, we can sum up crime across all of the 44 categories to get the total count of items stolen in London. We can also construct an aggregate price index for stolen goods and interpret this as a proxy for the changing return to crime.[2] Similarly we can include a measure of wages to represent the return to participating in the legal market for work.[3]

Figure 6: Crime, Price and Real Wages – Aggregate Measures (2002-2012)

Note: Crime measured as total count of items stolen in the 44-good panel constructed from London Metropolitan Police Service data. Price index measured as a 'Stolen Goods Price Index' where the weights are taken from each good's share in total crime in the baseline year of 2002. This index is then normalised by the total CPI. Real wages defined as the 10th percentile of the male wage distribution taken from the UK Labour Force Survey (LFS), normalised by the CPI.

The evolution of these series is shown in Figure 6 and shows some striking relationships. Both wages and the stolen goods price index track aggregate crime very well. The correlation between wages and crime is strong at -0.44 and the clear tracking

[2] To do this, we use the shares of each good in 2002 as the source of the weights for this 'stolen goods price index'. The resulting measure can be thought of as representing the changing value of the typical basket of stolen goods that criminals could use as part of their re-sale activity in order to obtain criminal income.
[3] The wage measure we use is derived from the UK Labour Force Survey (LFS), specifically the 10th percentile wage because, as per earlier studies (Machin and Meghir 2000), this area of the low-wage labour market is likely to the most relevant for the 'marginal' criminal.

between prices and crime is reflected in a correlation of 0.95. The relationship is still strong if we take measures to abstract from or remove the clear trends in the data. For example, the correlation between prices and crime is still 0.61 if we transform the data into 12-month differences, with the wage-crime correlation standing at -0.35.

Some formal time series models are presented in Table 3 (see Annex). These models compare the price and wage effects side-by-side, as well as including trends. The key point is that prices have the largest effect in aggregate. Columns (1) and (2) report models that reflect the effects of prices or wages when considered on their own. In column (3), prices and wages are compared side-by-side and finally in column (4) we include unemployment as an additional control for the influence of labour market conditions on crime.

These last two columns strongly indicate that crime is more sensitive to prices as compared to wages. Specifically, the elasticity for prices is 6-7 times higher than that for wages in the levels model (panel B) and still around 20% higher for the alternative 12-month difference specifications (which are much more stringent with respect to the statistical treatment of trends).

In terms of the overall contribution of prices to falling crime in this sample we can quantify it as follows, the average price of the stolen items in our 44-goods panel rose by 1.4 percent per year on average between 2002 and 2012. The overall CPI rose by 2.9 percent per year over the same time period, so that in real terms the value of the goods stolen by criminals had been falling (by 1.5 percent a year). One can ask how this fall in real terms could map into reduced crime rates by noting that the real price decline when multiplied by our elasticity of 0.35 predicts a 0.53 percent a year fall in crime, or 15 percent of the overall crime drop.

If instead of comparing to prices of all goods, we benchmark the 1.4 percent a year average price rise to the 2.7 percent a year growth in average wages in London (the legal alternative) between 2002 and 2012, we come up with a prediction of 13 percent of the overall crime drop.[4] Benchmarking to growth in the London 10th percentile weekly wage - since one might think the 10th percentile weekly wage is a more appropriate comparison for individuals on the margins of crime - predicts a slightly bigger 0.81 percent a year fall, or 23 percent of the overall crime drop.

[4] Average weekly wages in London rose from £550 in 2002 to £697 in 2012 (based on Annual Survey of Hours and Earnings data).

CONCLUSION

The evidence presented here for London data indicates that a strong relationship between prices and crime exists across a full range of goods. Furthermore, this relationship is pervasive enough to affect aggregate trends. Falls in the value of key, commonly stolen goods appear to have driven down the return to property crime over this period. Insofar that similar price trends were evident in earlier decades, this could help explain the long-term drop in crime.

The usual caveat 'more research is needed' applies but a specific direction seems clear. Specifically, there is a need to examine similar 'stolen goods price indices' across countries and establish a correlation with crime patterns in other settings. If that analysis proves that stolen goods price indices are also correlated across countries then a significant part of the international puzzle about the drop in crime could be solved. In turn, the simple policy implication of this would be to focus on efforts to force down the return to crime and respond to variations in returns. For example, investments in goods security are one way to lower returns and the booms in crime after prices rise for goods such as metals and jewellery suggest price data could be used as part of pre-emptive or 'predictive' campaigns to combat crime more quickly.

REFERENCES

Buonanno, P; Drago, F; Galbiati, R and Zanella, G (2011) "Crime in Europe and the US: Dissecting the 'Reversal of Fortunes". *Economic Policy*. July: 347-385.

Donohue, J and Levitt, S (2001) "The Impact of Legalized Abortion on Crime". *Quarterly Journal of Economics*. 116(3): 381-422.

Draca, M; Koutmeridis, T and Machin, S (2015) "The Changing Returns to Crime: Do Criminals Respond to Prices?". *CAGE Working Paper*, Warwick University.

Draca, M and Machin, S "Crime and Economic Incentives: A Review". *Annual Review of Economics*. 7: 389-408.

Levitt, S (2004) "Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that do not". *The Journal of Economic Perspectives*. 18(1): 163-90.

Machin, S and Meghir, C (2000) "Crime and Economic Incentives". *The Journal of Human Resources.* 39(4): 958-979.

Reilly, B. and R. Witt (2008) "Domestic Burglaries and the Real Price of Audio

Visual Goods: Some Time Series Evidence for Britain". *Economics Letters*. 100: 96-100.

Sidebottom, A; Belur, J ; Bowers, K; Tompson, L and Johnson, S (2011) "Theft in Price-Volatile Markets: On the Relationship Between Copper Price and Copper Theft" *Journal of Research in Crime and Delinquency*, 48, 396-418.

Wellsmith, M. and A. Burrell (2005) "The Influence of Purchase Price and Ownership Levels on Theft Targets" *British Journal of Criminology*. 45: 741-64.

Wolpaw-Reyes, J (2007) "Environmental Policy as Social Policy: The Impact of Childhood Lead Exposure on Crime". *The B.E Journal of Economic Analysis and Policy*. 7(8): 1935-1682.

ANNEX

Table 3: Prices versus Wages – Aggregate Estimates, London (2002-2012)

(A) 12-Month Differences	**(1)** Δ_{12}**Log(Crime)**	**(2)** Δ_{12}**Log(Crime)**	**(3)** Δ_{12}**Log(Crime)**	**(4)** Δ_{12}**Log(Crime)**
Δ_{12}Log(Price Index)	0.600***		0.598***	0.541***
	(0.105)		(0.099)	(0.126)
Δ_{12}Log(Wage 10th Percentile)		-0.089***	-0.088***	-0.073**
		(0.031)	(0.029)	(0.033)
Δ_{12}Log(Male Unemployment)				-0.033
				(0.047)
Time	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Observations	120	120	120	120
(B) Levels	**(1)** **Log(Crime)**	**(2)** **Log(Crime)**	**(3)** **Log(Crime)**	**(4)** **Log(Crime)**
Log(Price Index)	0.966***		0.823***	0.816***
	(0.034)		(0.041)	(0.053)
lLog(Wage 10th Percentile)		-2.986***	-0.702***	-0.694***
		(0.190)	(0.158)	(0.157)
Log(Male Unemployment)				0.015
				(0.044)
Time	-0.002***	-0.004***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Observations	132	132	132	132

Note: This table displays the log regressions of the total count of property stolen pooled across our 44-goods sample on a 'stolen goods price index' in which a total index is constructed using the shares of each good in total thefts in 2002 as weights. The additional control variables are the London 10th percentile weekly wage for males of age 16-64 (3-month moving average) and the London unemployment rate for males of age 16-64. All variables are measured monthly for the period 2002-2012. Panel (B) includes month dummies. Robust standard errors in parentheses


THE UNIVERSITY OF
WARWICK
E·S·R·C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL
CAGE
Competitive Advantage
in the Global Economy