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## Article

# Liquidating Crime with Illiquidity: How Switching from Cash to Credit Can Stop Street Crime

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## LIQUIDATING CRIME WITH ILLIQUIDITY: HOW SWITCHING FROM CASH TO CREDIT CAN STOP STREET CRIME<sup>1</sup>

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Technological advances often have far-reaching and unintended consequences for society. In some cases these consequences can be negative. For example, the advent of fossil fuel technology accelerated industrial and scientific progress in the 20<sup>th</sup> century, but has had - and may continue to have - adverse consequences for the environment that could offset such benefits in the future (Houser and Mohan 2014). In other cases, the unintended consequences are positive. The social networking platform Twitter was originally designed to facilitate social interactions between people, but has played an unexpectedly significant role in advancing democratic events and institutions, including the election of President Obama (Greengard 2009) and the Arab Spring (Lotan et al. 2011, Hermida, Lewis and Zamith 2014). Critically, technological advances are moving forward at ever-faster rates, in some cases so fast that we are unable to devise policies to keep apace (Rycoft 2006). This is as true for crime as it is for any other societal phenomenon.

An important technologically-oriented change in recent years has been the transformation of our monetary and financial system from one that relied heavily on cash to one that now operates digitally and virtually, relying on a massive and ever-expanding, worldwide telecom-

munications infrastructure. The pace of change in our financial system has been rapid and closely mimics the exponential growth in technologies related to information processing (see, e.g., Kurzweil 2004, Jorgenson 2001). The primary aim of those pressing for increased digitization of the financial system has been to increase efficiency, expand financial opportunity, improve transactional security and maximize wealth. Despite large-scale events such as the Great Recession, this formula has worked well. Financial markets are larger, more efficient and more profitable than they have ever been (Evans and Hnatkovska 2014). At the same time, the implementation of these systems and their continued growth has had important consequences at the societal level.

Digitized financial transactions, like any web-based process, are subject to data storage-based record keeping, thereby creating *de facto* permanent records and making them almost universally traceable. Indeed, this attribute has been increasingly exploited by law enforcement agencies globally in their efforts to combat terrorism (Canhoto 2014, Brzoska 2014, Bures 2012, D'Souza 2011, Levi 2010), black market weapons trading (Edelbacher, Theil and Kratoski 2012), human trafficking (Chuang 2006, Walker-Rodriguez and Hill 2011, Rankin and Kinsella 2011), tax evasion (Eccleston and Gray 2014, Mironov 2013, Unger and Can der Linde 2013), and the drug trade (Ott 2010). At the same time, there has also been concern regarding the extent to which traceable financial transactions impinge on the right to privacy and provide governments with excessive influence and control over citizens (Carlton 2012, Levi 2012). These positive and negative characteristics of the digital economy rest primarily on how it differs from one driven by cash.

As with digital transactions, cash presents advantages and disadvantages. Its primary attribute is that it remains the most liquid and anonymous transactional asset available, a boon for those wishing to engage in the most direct of exchanges or who wish to protect their identities. At the same time, this handicaps governments who wish to collect taxes or investigate crime, as well as consumers who may be victimized by certain kinds of cash-based fraud schemes. Cash is particularly well-suited to facilitating most illegal transactions for



<sup>1</sup> This paper does not represent the policy of either the Substance Abuse and Mental Health Services Administration (SAMHSA) or the US Department of Health and Human Services (DHHS). The views expressed herein are those of the authors and no official endorsement by SAMHSA or DHHS is intended or should be inferred.

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these reasons. Criminals know this, eschewing digital financial exchanges that are traceable and therefore “investigatable”. As a result, black and grey market economies worldwide are operated primarily with this medium (Schneider and Enste 2013, Naylor 2004).

For a variety of reasons, a significant amount of financial transactions in poor areas utilize cash. In the US, many of the poor are “unbanked” or “underbanked” (FDIC 2012, Rhine and Greene 2012). Chiefly, this is due to a lack of access to credit, locking poor consumers out of participation in the banking system. Because financial institutions are the primary means of accessing digital-based transactional capabilities (e.g., web-based banking, credit and debit-cards), the underprivileged have traditionally used cash in their day-to-day lives. Likewise, many businesses in poor neighborhoods have been slow to adopt credit- or debit card-based transactional technologies. In some cases, this may be in response to the underbanked customer-base they serve, while in others this has been a means of avoiding taxes (Schneider 2011, Morse, Karlinsky and Bankman 2009). These circumstances make community members in such neighborhoods both more likely to access black and grey markets and more vulnerable to predatory crime because cash is the primary target of acquisitive or “predatory” crimes (e.g., burglary, robbery, theft; see Rosenfeld and Messner 2013).

A great deal of the predatory activity that takes place in poor, urban neighborhoods is driven by the central role cash plays in the drug trade (Wright and Decker, 1994). The illegal nature of drugs makes their trade unsuitable for any form of electronic or online transactional system that creates a digital trail (including credit and debit cards, PayPal, Google Wallet, Square, etc). Few, if any, drug dealers are interested in exposing themselves to criminal investigations in this way, and most day-to-day street corner dealers lack the wherewithal to set up, establish, and operate the technological infrastructure required to accept digital transactions in any case. Moreover, many street drugs have pharmacological and pricing attributes that demand continuous, often rapid, acquisition and use. Crack, for example, is consumed by the average addict three to ten times per day (Mieczkowski 1990, Clemmey et al. 1997) and is priced at roughly USD 10–20 per use (Schifano and Corkery 2008, Desimone 2001). Similar consumption and pricing patterns emerge for methadone. Thus, bartering for drugs as an alternative to cash also makes little sense, as a would-be user would have to incessantly obtain items that a drug dealer would

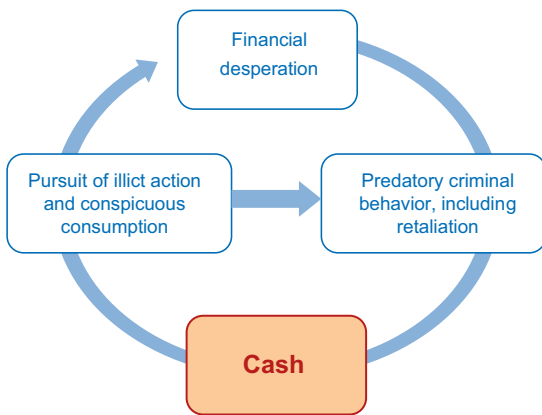
want in order to satisfy the daily, even hourly, demands of their habit.

More importantly, the drug trade is embedded within a larger socio-cultural context of the streets particularly well suited to – and in most cases predicated on – cash-based predatory crime. Previous research has identified a core group of street offenders responsible for driving much of the day-to-day predatory crime in the streets (see Wright and Decker 1994, 1997). These individuals lead exceedingly hedonistic lives, and are unencumbered by the day-to-day considerations of mainstream civil society. They generally hold little regard for long-term planning, are impulsive, inured to violence, and eschew the mores of middle class culture (such as legitimate work, seeking education, paying taxes, etc.) (see Brezina, Tekin and Topalli 2009; Topalli 2005). The hallmark of this lifestyle is its reliance on cash. These offenders actively engage in a “party-as-life” street culture (Shover and Honaker 1996) focused on illegal pursuits such as gambling, the sex trade, and especially drugs and alcohol. Their constant participation in these activities requires constant infusions of cash, as this is the only transactional medium that will allow offenders to pay for them without fear of detection and because the regularity of such pursuits requires transactional liquidity. However, the ease with which cash serves as a transactional medium for illegal pursuits also increases the likelihood that offenders will quickly exhaust their resources and become desperate for more cash (see Topalli and Wright 2014). This, in turn, drives street criminals to engage in predatory behavior to finance their hectic lifestyles. The resulting acquisition of cash then fuels the repetition of this cycle over time, as illustrated in Figure 1 (see Wright and Decker 1994). The primary targets of such crimes are people known to carry cash in the first place. In some cases this includes individuals who are themselves offenders (such as drug dealers; see Jacobs, Topalli and Wright 2000, Topalli, Wright and Fornango 2002). Often though, the targets of such predation have been neighborhood residents. As mentioned above, such individuals are unbanked or underbanked, meaning that they have typically conducted most of their financial transactions (such as groceries or rent) using cash. But what has been the source of cash among the poor?

In the United States, a significant source originates from “welfare” benefits (referred to as Temporary Assistance to Needy Families, or TANF). Historically, TANF payments were mailed as paper checks to beneficiaries on a monthly basis. Consequently, large amounts of cash

Figure 1

## Etiological cycle of street crime



Source: Wright et al. (2014).

were available to welfare recipients at one point in time each month (Ford and Beveridge 2004)<sup>6</sup>. Because so many recipients lack access to banks, they typically relied on a network of locally owned and operated check cashing establishments common to poor neighborhoods in the US. These establishments and the monthly schedule of payments were well known to predatory offenders. Consequently, neighborhood residents who cashed their benefits represented vulnerable targets of opportunity for robbers, burglars, and thieves seeking cash to bankroll their pursuit of illicit action.

Over a roughly 15-year span stretching from the Reagan to Clinton administrations, the US Federal government made a number of significant legislatively backed policy changes vis-à-vis benefits payments, the most important of which was the introduction of an electronic benefits transfer (EBT) system whereby check-based welfare payments were to be replaced by debit-cards. The primary aim of this system change was to reduce the financial impact of benefits transfer to the government by eliminating printing and mailing costs, reducing welfare fraud, speeding up transfers and improving record keeping. The process began in the 1980s with a number of EBT demonstration programs and ended in the 1990s with the Personal Responsibility and Work Opportunity Reconciliation Act. Welfare reform legislation enacted in 1996 required every state in the

<sup>6</sup> In addition, food assistance benefits, now referred to as Supplemental Nutrition Assistance Program (SNAP) benefits, were previously distributed as “food stamps”. Prior to their inclusion in the EBT system, these benefits were relatively fungible in that they could be exchanged between recipients illegally or traded in at vendors for cash. A key reason for establishing EBT was to prevent such illegal trafficking (see USDA, 2003), thus removing an additional yet indirect source of cash from the streets.

US to develop EBT systems to program benefits electronically by 2002. In a recent paper (Wright et al. 2014), we surmised that the variable introduction of the EBT system would effectively reduce the amount of cash circulating on the streets among those most often targeted by predatory offenders. The end result of such a drain on the flow of cash in poor neighborhoods would be a disruption of the predatory criminal cycle described above, resulting in a drop in predatory acquisitive crimes post EBT implementation.

Our research team tested this hypothesis by measuring the extent to which moving assistance payments to the poor from a check-based system to one that was digital (via EBT cards) would have just this effect. In order to test our hypothesis, we focused on the state of Missouri, which has implemented its EBT program in eight phases in different sets of localities (counties) between June 1997 and May 1998. With the introduction of the EBT program, welfare recipients residing in each of these localities – previously forced to cash their benefits checks at private check cashing establishments – were now able to expend their funds via the EBT system and no longer had to carry their financial resources with them. This removed a significant source of money that fueled criminal predation and thereby reduced opportunities for victimization. The decreasing supply of cash was expected to reduce opportunities for criminal predation, as reflected in typical crime statistics.

More specifically, we assembled county level monthly data on various types of crime from the state of Missouri between 1990 and 2011, including total crime, burglary, robbery, larceny, and motor vehicle theft. These data are drawn from the Uniform Crime Reporting (UCR) Program of the Federal Bureau of Investigation (FBI), which represents “a nationwide, cooperative statistical effort of nearly 18,000 city, university and college, county, state, tribal, and federal law enforcement agencies voluntarily reporting data on crimes brought to their attention.” Importantly, because various sets of counties initiated the implementation of the EBT program in different months between 1997 and 1998, this variation across space and time gave us the leverage to employ a difference-in-difference method, which is critical for identifying the causal effect of the program. The difference-in-difference method basically produces the difference in average crime rates in the jurisdictions with an EBT program before and after the implementation date, net of the difference in average crime rates in those counties without an EBT program. To the extent that there is no other plausible mechanism through

which EBT implementation could cause an independent effect on crime, any association obtained between EBT implementation and crime could then be attributed to the removal of cash. Given the count nature of the crime data, we estimated our difference-in-difference specification using a fixed effects negative binomial regression.

Our results indicated that the EBT program implementation caused a significant decrease in the overall crime rate and the specific offenses of burglary, assault and larceny in Missouri. According to our point estimates, the decline in the overall crime rate in Missouri caused by the EBT program was 9.8 percent, while reductions in burglary, assault, and larceny totaled 12.5 percent, 7.9 percent, and 9.6 percent, respectively. We also found evidence suggesting the EBT program also resulted in less robbery. It is important to note that we tested and rejected the alternative explanation that the implementation of the EBT program simply had a displacement effect, i.e., a situation whereby crime decreased in counties with an EBT program in effect, while increasing in other counties.

To gain a broader perspective on our findings, we also calculated the total disbursements made under the welfare programs in Missouri in 1997 in the treatment counties, which totaled USD 671.2 million. This figure can be interpreted as the maximum amount of cash that needs to be removed from circulation in order to produce a decrease of 9.8 percent in the total crime rate.

We also examined arrests as an additional outcome and found that EBT also had a negative impact on arrests, especially those associated with non-drug offenses by a magnitude of 9.2 percent. This finding is reassuring for our crime results because, if our hypothesis for the effect of EBT program implementation on crime is correct, then we should expect fewer crimes to be committed, which, in turn, should result in fewer arrests.

There is significant evidence that the United States economy is moving away from cash as a transactional medium. The proportion of financial transactions utilizing cash has steadily decreased, largely due to the increased use of credit cards, which entered the United States market in the 1950s. In the 1970s, ATM and debit cards were introduced to the US market. More recently, there has been a more pervasive increase in mobile financial transactions (see Erling 2013). Furthermore, over three-quarters of all non-cash payments in the United States in 2009 were made electronically, a nine percent increase from 2006 (Federal Reserve System

2011).<sup>7</sup> Actually, cash transactions in the United States have steadily declined over a much longer span of time. Eighty percent of financial transactions were made using cash fifty years ago, compared to roughly fifty percent today.

There is no reason to believe that cash transactions will not continue to decline in the future as the proliferation of online banking and commerce platforms continues to grow. Since 1990 debit transactions have risen 27-fold, while cash volume has grown at an annual rate of only four percent (see Littman and Oliver 2012). It is also important to note that checks were the primary means of benefits transfer to the poor, but their overall use declined by over 50 percent over that same time period. This move away from cash is, of course, not unique to the United States; and has been even more strongly embraced by other countries. Sweden (Tomlinson 2012) and Israel (Shamah 2014) for example, have instituted policy-driven legislation that makes cash less advantageous to use, and encourages electronic monetary transactions (primarily to combat tax evasion, but also for the purposes of curtailing other forms of cash-based crime). The results of Wright et al. (2014) suggest that as the world moves further and further away from cash, cash-based crimes – primarily those that are acquisitive and predatory and that occur on the streets – will continue to drop.

This raises an important policy proposition, namely the purposeful and universal banning of cash as legal tender and its replacement with a networked digital transactional system of monetary transfer, with a view to eliminating cash-reliant acquisitive crimes like robbery, larceny, and burglary. Because the world economy seems to be moving inevitably toward a universally cashless system, the policy question has more to do with whether governments (in concert with financial institutions) should accelerate this process or allow it to take its natural course.

Taking this into account, it is important to note that the shift from check-based to EBT-based transfer of benefits to the poor was not designed specifically to combat these types of crime. It was for the purposes of streamlining the benefits transfer process, improving accounting, and curtailing fraud. It is also important to note that the shift was made long after the US and most of the remaining industrialized world began to adopt and integrate electronic monetary transfer protocols into their financial systems and institutions. Thus, the role

<sup>7</sup> In the US, electronic payments account for over 75 percent of all noncash payments. Meanwhile, check payments now represent less than 25 percent (Federal Reserve System, 2011).

played by EBT implementation on crime in the US is only a small part of the overall story of how cashless economies will eventually affect crime. To some extent this has to do with the target populations of acquisitive and predatory crime. Middle and upper class citizens in the US who carried a certain amount of cash with them back in the 1970s were not significantly more at risk of victimization than they are today, even though they are far less likely to carry cash today. That is because they live in environments where the threat of interpersonal crime has always typically been low. This is not the case for residents of poor neighborhoods where predatory crime has been a constant threat. The same individual carrying cash in such neighborhoods during the 1970s was significantly more at risk of victimization than they would be today if they were now utilizing the EBT system to receive their benefits. Because poor urban individuals are the primary source of victims for such crimes, it is no surprise that the implementation of EBT among this population correlates so well with the widely acknowledged drop in the US crime rate, which began in the 1990s and continues through to today (Blumstein and Wallman 2006).

As such, the transition to a cashless environment may be made on a community-by-community basis. We know from Wright et al. (2014) that the variable transition of EBT across counties in Missouri did not evidence any shifts of crime from counties that adopted EBT to those that had not yet done so. Assuming geographical variations in crime distribution follow similar patterns at more local municipal levels (say at the city, town, or village level), it could be assumed that local communities could adopt cashless ordinances based on their current levels of acquisitive and predatory crime. The benefits of such a move would be the reduction not only of acquisitive and street crimes, but also of cash-based fraud schemes and tax evasion by merchants themselves. In addition, since many acquisitive and street crimes occur between offenders, a reduction in such crimes would also prevent offender-on-offender retaliatory violence (see Jacobs, Topalli and Wright 2000, Topalli, Wright and Fornango 2002), which has been demonstrated to be recursive and contagious (Wright and Topalli 2014).

There are some unintended consequences that may or may not be viewed as negative or positive depending on the constituency evaluating such outcomes. For example, a fully cashless economy (or one localized to a particular region or city) would substantially impact undocumented (sometimes referred to as “illegal”) immigration. Undocumented laborers enter the country to

find work that can be paid for in cash if the employer wishes to avoid running afoul of local or national labor, employment, and tax laws. Eliminating cash makes such schemes almost impossible to execute. While some may cheer on such a development, the fact remains that many employers, particularly in agriculture, rely on such workers to sustain their enterprises (and maintain affordable food pricing). At the same time, this development would make it less likely that undocumented workers would be exploited or abused.

In neighborhoods where cash is still heavily used and where access to banking and other forms of digital transactions are scarce, the move to banning cash would have a severe impact on black and grey markets, as well as on a variety of quasi-legitimate businesses that serve to sustain such communities (unlicensed daycare centers, day workers, so-called shade tree mechanics, etc). As is the case with undocumented immigrants, this is a double-edged sword. On the one hand, the elimination of such quasi-legal or outright illegal operations would reduce the chances of abuse or harm (for example in the case of an unlicensed daycare facility whose workers are unsuitable for the care of children). On the other hand, there is no doubt that these kinds of employment and business activities sustain communities where few, if any, legitimate opportunities for making money or obtaining such services actually exist. Thus, the challenge of executing a cashless policy in the service of reducing crime is to ensure that the implementation does not replace the bane of criminal victimization that poor people experience with economic isolation. As economies grow and change, the critical question will not be whether crime goes away: The evidence suggests that street crime will, but it is likely to be replaced with internet- or online-based crime. Rather, the key issue has to do with whether communities that adopt such strategies also have in place procedures for ensuring that those most affected by the removal from cash will have access to sustainable economic growth and financial inclusion, and do not fall behind.

## References

- Blumstein, A. and J. Wallman (2006), *The Crime Drop in America*, Cambridge University Press, New York.
- Brezina, T., E. Tekin and V. Topalli (2009), “Might Not Be a Bomorrow: A Multimethods Approach to Anticipated Early Death and Youth Crime”, *Criminology* 47, 1091–129.
- Brzoska, M. (2014), “Consequences of Assessments of Effectiveness for Counterterrorist Financing Policy”, *Administration & Society* 46(7), forthcoming.

- Bures, O. (2012), "Private Actors in the Fight Against Terrorist Financing: Efficiency Versus Effectiveness", *Studies in Conflict & Terrorism* 35(10), 712–32.
- Canhoto, A. I. (2014), "Speculative Security: The Politics of Pursuing Terrorist Monies", *Journal of Cultural Economy* 7(2), 249–52.
- Carlton, C. F. (2012), "The Right to Privacy in Internet Commerce: A Call for New Federal Guidelines and the Creation of an Independent Privacy Commission", *Journal of Civil Rights and Economic Development* 16(2), Article 7.
- Chuang, J. A. (2006), "The United States as Global Sheriff: Using Unilateral Sanctions to Combat Human Trafficking" *Michigan Journal of International Law* 27(2), 437–94.
- Clemmey, P., R. Brooner, M. A. Chutuape, M. Kidorf and M. Stitzer (1997), "Smoking Habits and Attitudes in a Methadone Maintenance Treatment Population", *Drug and Alcohol Dependence* 44 (2–3), 123–32.
- Desimone, J. (2001), "The Effect of Cocaine Prices on Crime", *Economic Inquiry* 39(4), 627–43.
- D'Souza, J. (2011), *Terrorist Financing, Money Laundering, and Tax Evasion: Examining the Performance of Financial Intelligence Units*, CRC Press, Boca Raton.
- Eccleston, R. and F. Gray (2014), "Foreign Accounts Tax Compliance Act and American Leadership in the Campaign against International Tax Evasion: Revolution or False Dawn?", *Global Policy*, forthcoming.
- Edelbacher, M., M. Theil and P. C. Kratoski (2012), *Financial Crimes: A Threat to Global Security*, CRC Press, Boca Raton.
- Erling, G. (2013), "Cash is Dead, Long Live Cash", *Journal of Payments Strategy & Systems*, 7(1), 43–9.
- Evans, M. D. and V. V. Hnatkovska (2014), "International Capital Flows, Returns and World Financial Integration", *Journal of International Economics* 92(1), 14–33.
- Federal Deposit Insurance Corporation (2012). National Survey of Unbanked and Underbanked Households: Executive Summary. Retrieved from [http://www.fdic.gov/householdsurvey/2012\\_unbankedreport\\_execsumm.pdf](http://www.fdic.gov/householdsurvey/2012_unbankedreport_execsumm.pdf).
- Federal Reserve System (2011), "The 2010 Federal Reserve Payments Study: Noncash Payment Trends in the United States: 2006-2009", [http://www.frbservices.org/files/communications/pdf/press/2010\\_payments\\_study.pdf](http://www.frbservices.org/files/communications/pdf/press/2010_payments_study.pdf).
- Ford, J. M. and A. A. Beveridge (2004), "'Bad' Neighborhoods, Fast Food, 'Sleazy' Businesses, and Drug Dealers: Relations Between the Location of Licit and Illicit Businesses in the Urban Environment", *Journal of Drug Issues* 34(1), 51–76.
- Greengard, S. (2009), "The First Internet President", *Communications of the ACM* 52(2), 16–8.
- Hermida, A., S. C. Lewis and R. Zamith (2014), "Sourcing the Arab Spring: A case Study of Andy Carvin's Sources on Twitter During the Tunisian and Egyptian Revolutions", *Journal of Computer-Mediated Communication* 19(3), 479–99.
- Houser, T. and S. Mohan (2014), *Fueling Up: The Economic Implications of America's Oil and Gas Boom*. Peterson Institute for International Economics, Washington, DC.
- Jacobs, B. A., V. Topalli and R. Wright (2000), "Managing Retaliation: Drug Robbery and Informal Sanction Threats", *Criminology* 38(1), 171–98.
- Jorgenson, D. W. (2001), "Information Technology and the US Economy", *American Economic Review* 91(1), 1–32.
- Kurzweil, R. (2004), "The Law of Accelerating Returns" in C. Teuscher, ed., *Alan Turing: Life and Legacy of a Great Thinker*, Springer-Verlag Berlin Heidelberg, pp. 381–416.
- Levi, M. (2010), "Combating the Financing of Terrorism A History and Assessment of the Control of 'Threat Finance'", *British journal of criminology* 50(4), 650–669.
- Levi, M. D. (2012), "Fiscal Consequences of Scrapping Cash", *Journal of Payments Strategy & Systems* 6(3), 283–300.
- Littman, D., and N. Oliver (2012), "Meeting the Demand for Cash", *Forefront*, 20–23. [http://www.clevelandfed.org/Forefront/2012/winter/pdf/ff\\_2012\\_spring\\_13.pdf](http://www.clevelandfed.org/Forefront/2012/winter/pdf/ff_2012_spring_13.pdf).
- Lotan, G., E. Graeff, M. Ananny, D. Gaffney and I. Pearce (2011), "The Revolutions were Tweeted: Information Flows During the 2011 Tunisian and Egyptian revolutions. *International Journal of Communication* 5, feature 1375–405.
- Mieczkowski, T. (1990), "Crack Distribution in Detroit", *Contemporary Drug Problems* 17(1), 9–30.
- Mironov, M. (2013), "Taxes, Theft, and Firm Performance", *The Journal of Finance* 68(4), 1441–72.
- Morse, S. C., S. Karlinsky and J. Bankman (2009), "Cash Businesses and Tax Evasion", *Stanford Law & Policy Review* 20(1), 37–68.
- Naylor, R. T. (2004), *Wages of Crime: Black Markets, Illegal Finance, and the Underworld Economy*, Cornell University Press, Ithaca.
- Ott, T. P. (2010), "US Law Enforcement Strategies to Combat Organized Crime Threats to Financial Institutions", *Journal of Financial Crime* 17(4), 375–86.
- Rankin, G. N. and Kinsella (2011), "Human Trafficking – The Importance of Knowledge Information Exchange", in B. Akhgar and S. Yates, eds., *Intelligence Management* Springer, London, 159–80.
- Rhine, S. L. and W. H. Greene (2012), "Factors that Contribute to Becoming Unbanked", *Journal of Consumer Affairs* 45, 21–45.
- Rosenfeld, R. and S. F. Messner (2013), *Crime and the Economy*. Sage Publications.
- Rycroft, R. W. (2006), "Time and Technological Innovation: Implications for Public Policy", *Technology in Society* 28(3), 281–301.
- Schifano, F. and J. Corkery (2008), "Cocaine/Crack Cocaine Consumption, Treatment Demand, Seizures, Related Offences, Prices, Average Purity Levels and Deaths in the UK (1990–2004)", *Journal of Psychopharmacology* 22(1), 71–9.
- Schneider, F. (2011), *The Shadow Economy in Europe, 2011*, Atkearny Study.
- Schneider, F. and D. H. Enste (2013), *The Shadow Economy: An International Survey*. Cambridge University Press, Cambridge.
- Shamah, D. (2013), Government Dream of a Cashless Society Already a Reality. The Times of Israel, <http://www.timesofisrael.com/government-dream-of-a-cashless-society-already-a-reality/>.
- Shover, N. and D. Honaker (1992), "The Socially Bounded Decision Making of Persistent Property Offenders", *The Howard Journal of Criminal Justice* 31(4), 276–93.
- Tomlinson S., (2012), "Sweden Could Be First Country to Go Cashless as Even Churches are Taking Cards for Offerings", *The Daily Mail*, 20 March 2012, <http://www.dailymail.co.uk/news/article-2117643/Sweden-Country-cashlesschurches-accepting-cards-offerings.html>.
- Topalli, V. (2005), "When Being Good is Bad: an Expansion of Neutralization Theory", *Criminology* 43(3), 797–836.
- Topalli, V., R. Wright and R. Fornango (2002), "Drug Dealers, Robbery and Retaliation. Vulnerability, Deterrence and the Contagion of Violence", *British Journal of Criminology* 42(2), 337–51.
- Unger, B. and D. Van der Linde (2013), *Research Handbook on Money Laundering*. Edward Elgar Publishing, Cheltenham.
- Walker-Rodriguez, A. and R. Hill (2011), "Human Sex Trafficking", *FBI Law Enforcement Bulletin* 80(3), 1–9.
- Wright, R. T. and S. Decker (1994), *Burglars on the Job*, Northeastern University Press, Boston.
- Wright, R. T. and S. Decker (2011), *Armed Robbers in Action: Stickups and Street Culture*. UPNE, Lebanon, New Hampshire.
- Wright, R., E. Tekin, T. Topalli, C. McClellan, T. Dickinson and R. Rosenfeld (2014), "Less Cash, Less Crime: Evidence from the Electronic Benefit Transfer Program", NBER Working Paper No.19996.