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ARTICLES

Crime Dynamics at Lithuanian Borders

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ABSTRACT

This article compares levels and patterns of offences in different parts of Lithuania
with the aim of assessing whether border regions are more susceptible to crime
than the rest of the country. The article focuses on identifying and explaining
these patterns for selected categories of offences while taking account of
contextual factors. Spatial statistical techniques and Geographic Information
Systems underpin the methodology employed. Findings suggest that there are
variations in the level and geography of offences between border regions and the
rest of the country. Despite the fact that the highest average increases in recorded
criminal offences were found in two border regions, non-border regions had a
higher average increase in the 1990s. This partially explains why, out of the six
selected offences, only assault shows an increase owing to the 'border effect'. The
proportion of the population living in urban areas is by far the most important
covariate in explaining the regional variations in offence ratios.

KEY WORDS

Geographic Information System / Offence Patterns / Spatial Modelling /
Transition Countries.

Borders are scars of history [1]

Introduction

Relatively little is known about crime dynamics in border regions. Studies
that deal with crimes involving the illegal transport of goods or people over
borders are often *a-spatial*. This means that most of these studies focus on
the processes of criminal businesses, flows or networks, instead of looking

[1] AGEG/AEBR/ARFE, *European charter for border and cross-border regions* (2004: 3).

at local aspects of the borders or countries (e.g. Nordstrom 2000; Burnham 2003; Chawla and Pietschmann 2005). Although many would argue that local factors do not matter, there is little evidence that border regions differ from other regions in their susceptibility to crime (but see Ceccato and Haining 2004). This paper contributes to this knowledge base by using Lithuania as a case study to assess whether border regions are more affected by crime than the rest of the country (Figure 1).

Lithuania has been chosen for several reasons. First, since the collapse of the Soviet empire, Lithuania has undergone a period of profound political, economic and social changes. Together with Estonia and Latvia, Lithuania is today a liberal democracy, a parliamentary republic, and fast heading toward a so-called 'market economy'. These changes are expected to have implications for the level and composition of offences as well as their geographies. Historically, Lithuania and other Baltic countries have been transit countries between East and West (Ulrich 1994). However, now that Lithuania has joined the European Union (EU), it has become a border state on the critical eastern border with non-EU countries, such as Belarus and Russia (Kaliningrad oblast). Joining the EU meant an initial process of (re)structuring of institutions and setting them up to adapt rapidly to EU standards, including control of people and goods at the borders. Lithuania's border regions are therefore particularly interesting because they are directly exposed to such changes.

Lithuania constitutes an interesting case since it is geographically encapsulated by its neighbours, with a border of 1733 km (119 km with the Baltic sea, 272 km with Russia (Kaliningrad oblast), 651 km with Belarus, 588 km with Latvia and 103 km with Poland) controlled by 70 border crossing points (Appendix 1). The country requires specific frameworks of border control over land, sea and air traffic. Border controls cover only a portion of the illegal activities that take place in Lithuania either as an origin or as a transit country. Whereas most illegal goods seized at borders consist of cigarettes and alcohol, Lithuanian organized crime groups are involved in a much wider range of activities, including drug trafficking, trafficking in women for prostitution, illegal immigration, stolen vehicle trafficking and currency counterfeiting (Europol 2004).

Owing to a lack of data and their poor quality, there has been relatively little interest in post-Soviet states. However, since most statistics for these countries have followed international standards since the mid-1990s, data provided by the public authorities can now be regarded as relatively robust. This, of course, does not mean that data, particularly those on crime, are free from problems. Crime records have been influenced by political and administrative changes in the country and by changes in the criminal code
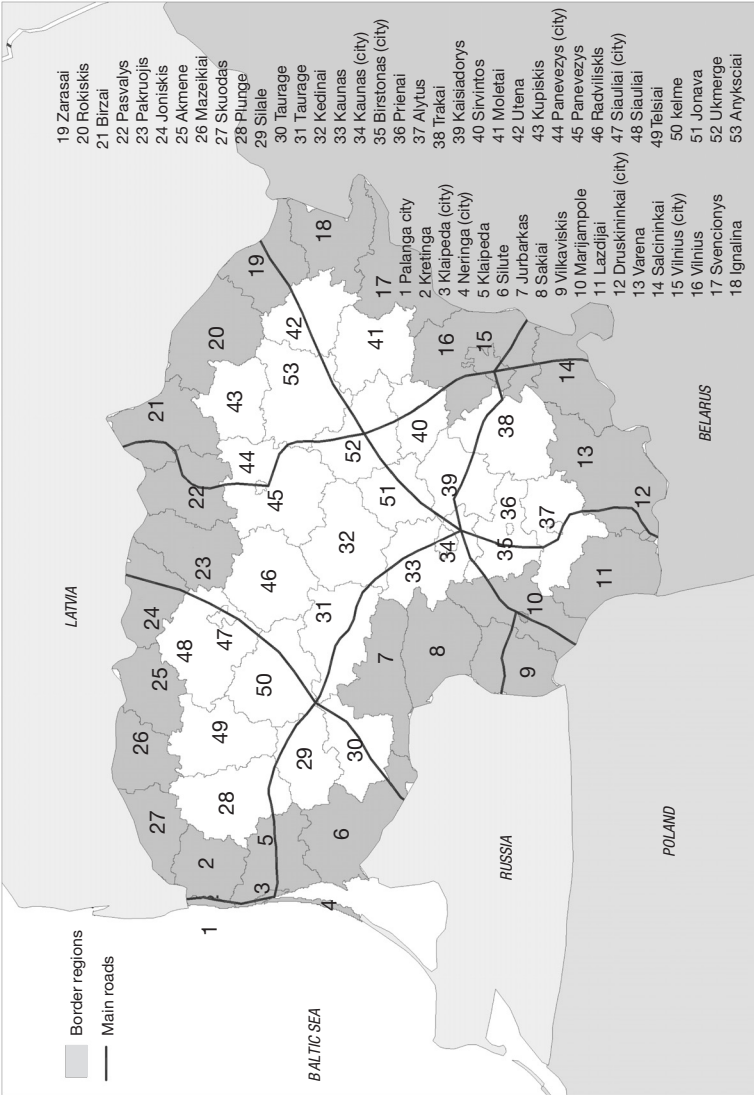
Figure 1   Lithuanian borders, 2005.

and in police practices, including corruption, particularly at the border (ACRC 2005).[2]

This article has two principal objectives. The first is to describe the characteristics of different regions within Lithuania that may be related to patterns of crime and to explain the country's position as an area of origin or transit for various kinds of cross-border crime. The second objective is to assess whether the borders have any effect on overall levels or geographical patterns of various types of crime in Lithuania. The structure of the article is as follows. The first part discusses factors that make border regions more susceptible to crime. The next part describes the data set, assesses the quality of the available data, and briefly characterizes Lithuania as a case study. The central part of the article then tests the effect of borders on the level and spatial distribution of various types of crime, using ordinary least squares (OLS) regression models. The results from modelling the effect of borders on offence patterns in this way are then discussed, and the article concludes with a discussion of possible directions for future work.

Susceptibility of border regions to crime

Political borders and the areas close to them are unique places for criminal activities. Although 'Europe without borders' and 'cross-border co-operation' (e.g. AGEG/AEBR/ARFE 2004) have been buzzwords in Europe during the past two decades, the borders between European states of course remain extremely important.

The vulnerability of border regions to crime may simply be due to a country's relative location (e.g. surrounded by other countries or on an isolated island) and a border's geography (e.g. length, landscape, adjacency to land or sea, or connection by a bridge), which may impede or facilitate criminal activity (Field et al. 1991; Vagg 1992). There are also societal structures and organizational and cultural differences between states that affect borders' susceptibility to crime, such as differences in laws and law enforcement and lack of harmonization in criminal law and criminal justice practice. There are at least three other factors that make borders and the areas close to them unique places for criminal activities (Figure 2):

1. *Border regions are contact zones between states.* A border itself is an institution to control the flow of people into and out of a country and regulate cross-border trade. Borders are particularly vulnerable places because states may differ in

[2] Although the number of bribery cases reported decreased substantially in Lithuania in 2004 compared with 2002, Customs was the most frequently mentioned institution where bribery was practised (Transparency International 2004: 19). Bribery is still perceived as a major problem in Lithuania; according to the 2000 ICVS, police officers are more likely than Customs officers to be involved in acts of corruption (UNICRI 2000).

taxation, tariffs and regulations over goods. Also, economic inequality between countries may stimulate marginalized groups to seek illicit business across the border as a means of survival, so that cross-border areas become the market for illicit businesses based in relatively poor regions of other countries nearby.

2. *Border regions are permeable transit zones*. Borders represent an evolving gateway to facilitate contact and interchange; therefore they may witness greater circulation of people and goods than other regions. Borders offer offenders the possibility of a quick escape to other countries' jurisdictions, a condition that does not exist in other parts of the country. Borders will not affect most offenders because crime is a local activity that is committed in 'familiar places' (Brantingham and Brantingham 1981) or at relatively short distances from offenders' homes (White 1932; Wiles and Costello 2000). On the other hand, borders facilitate the in-flow of transient groups who are unfamiliar with the local environments. Individuals are more vulnerable to victimization in places that are unknown to them. This leads to an increase in victimization among tourists, so-called 'tourism criminality' (e.g. Ceccato and Haining 2004), especially in border regions.

3. *Border regions have the ecological structure to support symbiosis of domestic and cross-border/transnational crime.* This may happen at two levels. At one level there is a link through the medium of corrupt practices between organized crime and the authorities, both at the borders and elsewhere (e.g. Hajdnijak 2002; UNODC 1994). At a more local level, 'on the streets', there are interactions between typical cross-border crimes such as smuggling and drugs-related offences and crimes of local origin such as violence and thefts. Offenders are versatile, and changes in the volume and characteristics of cross-border crime may affect locally based crimes at or near the border. For example, drug addiction affects local rates of theft (Hough 1996), car contraband affects levels of car theft, and conflicts between rival smuggling groups affect local rates of violence (Gutauskas et al. 2004).

The analysis of Lithuania focuses not on crime types that involve cross-border movement, but rather on those that are a consequence of the location of the border and the human interactions that it provides. Offences in the first category considered are those related to the transition from a planned to a market economy; examples are theft (of all types) and burglaries. This shift towards the market has been associated with uncertainty and social instability, which constitute a breeding ground for violence (e.g. Pridemore 2002); hence, offences in the second category analysed are those associated with stress and social disorganization, such as assault, robbery and homicide. The next section frames Lithuania as a case study and focuses on data availability and quality.

Background and data

Data on offences at regional level (*savivaldybe*[3]) were obtained from the Interior Ministry's database. This is a centralized registration system that

[3] Data for the town municipalities of Marijampole and Alytus as individual geographical units were not available.
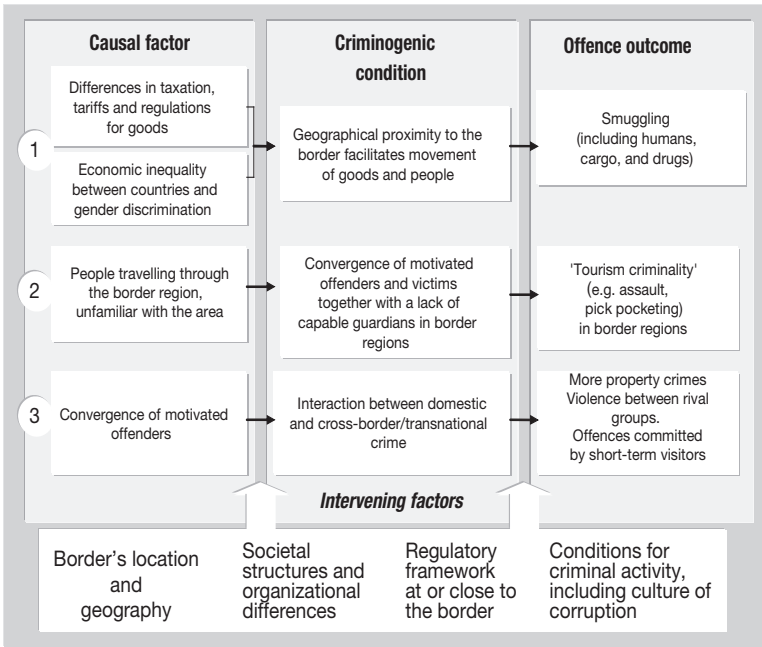
Figure 2   Susceptibility of Lithuanian border regions to crime: A conceptual framework.

since 1971 has been responsible for formatting crime data, controlling data quality and making data public. Crime recording began to shift into a systematized format in the 1970s, when Lithuania was still part of Soviet Union. As early as 1994, crime recording was computerized, but the system was not standardized until 2003, when all police commissariats had access to a single computerized recording system. To calculate the average increase, crime data from 1993 to 2000 were used. Data after 2000 were excluded from the analysis because they cannot be compared with previous years, for two reasons. First, since 1 May 2003, the method of recording police crime data has changed in Lithuania to fit the new penal code; this partly explains the increase in the number of recorded crimes in international statistics. In most cases, this was owing to changes in crime definitions or in the status of certain activities as criminal (e.g. smuggling of goods, misdemeanour). Theft is the crime category most significantly affected (minor thefts[4] that before 2003 were regarded as administrative offences now qualify as criminal offences).

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[4] Damage of less than 125 litas (about €35).

Second, after 2000 a few changes in municipal boundaries affected local crime data. Police records for a select group of offences in 2004, as well as changes in offence levels between 1993 and 2000, were used in the present analysis. Data on population demographics, socioeconomic status and several indicators of the municipalities (Appendix 2) were obtained from Statistics Lithuania. A digital map of Lithuania was obtained from the Baltic Sea Region GIS maps and ESRI World Basemap Data and used as a basis for the spatial modelling analysis.[5]

Data from the 2000 Vilnius Crime Victimization Survey (ICVS) were used for comparison of trends with those shown by police-recorded crime. Vilnius was one of the 16 cities where the fourth wave of ICVS was conducted in 2000. The sample in Vilnius was based on 1526 face-to-face interviews; of course, trends for Vilnius can serve only as indicators for what is happening in the whole country.

Several sources of data were used to describe the characteristics of the border regions. Criminal statistics on human smuggling (number of cases, cases handled in court, solved cases, number of victims and convictions) were obtained from the Ministry of Interior for the years 1999–2004. Data on human trafficking were gathered from reports from several destination countries, such as Germany, Scandinavian countries, France and the UK. Data describing what is happening at the borders come from state border guards reporting to the Ministry of the Interior, which has a system for recording the actions taken to apply border controls and the results produced thereby (Veiklos rezultatu apskaiciavimo sistema – VRAS). Data for each border were obtained from 1995 to 2004. Although border data have become more reliable since 2000 when a computer system was implemented, these records cannot be used on their own to understand the processes underlying cross-border crime. Yearly cross-sectional data are 'snapshots' of multiple processes going on in the country that, in certain cases, have links elsewhere. Another limitation is the fact that these records reflect not only the flow of passengers and goods but also changes in police practices. Border guard data were double-checked against data from the Customs Criminal Service (Muitinės kriminalinės tarnybos, MKT) for the first half of 2001 to the first half of 2005. The data show the number of criminal cases and pre-trial investigations by crime type, as well as their cost. Details of the largest shipments detected by Customs during the past two years were also used in the analysis.

[5] Baltic Sea Region GIS maps, URL (consulted 13 November 2006): http://www.grida.no/ baltic/index.htm and ESRI World Basemap Data, URL (consulted 13 November 2006): http://www.esri.com/data/download/basemap/index.html.

Framing Lithuania as a case study

After 50 years of communist rule, Lithuania proclaimed its independence on 11 March 1990. In 1998, the country became an associate member of the EU, and in May 2004 it joined the European Union after 91 percent of Lithuanians backed EU membership. As many as 84 percent of the Lithuanian population are ethnic Lithuanians. Poles are the largest minority, followed by Russians, and both are concentrated mostly in urban areas.

The largest and most populous of the Baltic states (3,422,000 inhabitants, with two-thirds living in urban areas), Lithuania consists of 10 counties divided into more than 50 municipalities. Two out of the three largest urban areas (Vilnius in the south-east of the country, with 541,000 inhabitants, Kaunas in the centre, with 364,000 inhabitants, and Klaipeda on the Baltic coast, with 189,000 inhabitants) are regarded as border regions (Vilnius and Klaipeda). These three municipalities are densely populated and relatively affluent. For instance, they receive the highest shares of foreign investments per capita in Lithuania, which partially explains the high level of social inequality (the Gini index was 35.4 percent in 2002). However, they also experience some of the highest rates of reported offences in the country. The country's location in relation to Belarus and Kaliningrad oblast also accounts for the high percentage of Lithuania-based organized crime groups dealing in various goods, including illegal weapons, human smuggling and contraband products such as cigarettes, clothes, furniture and technology. Marijampole county, for instance, bordering Poland and Kaliningrad oblast, is known as an important 'transit' region of Lithuania owing to its well-developed transport infrastructure and links both north to south and west to east (Figure 1).[6]

Criminogenic conditions in Lithuania

Lithuania has experienced an overall increase in the number of reported offences during the past decade. Total recorded crimes per 10,000 inhabitants rose from 159 in 1993 to 234 in 2000. This trend is similar for other Baltic countries (Statistical Office of Estonia 2005) but not exactly the same for all types of offences. Property crimes such as car-related thefts and domestic burglary are by far the most common types of offence in Lithuania. Violent crimes such as homicide, assault and robbery changed little in the same period according to police records (Figure 3). Trends shown by police records are also confirmed by 2000 ICVS. As much as

[6] Most transit cargo flows are through the Trans-European transport corridors (TEN) crossing the region: North–South corridor No. I – Via Baltica, connecting Warsaw to Helsinki – and East–West corridor No. IX (railway branches IXD Kiev–Klaipeda and IXD Kaunas–Kaliningrad oblast).
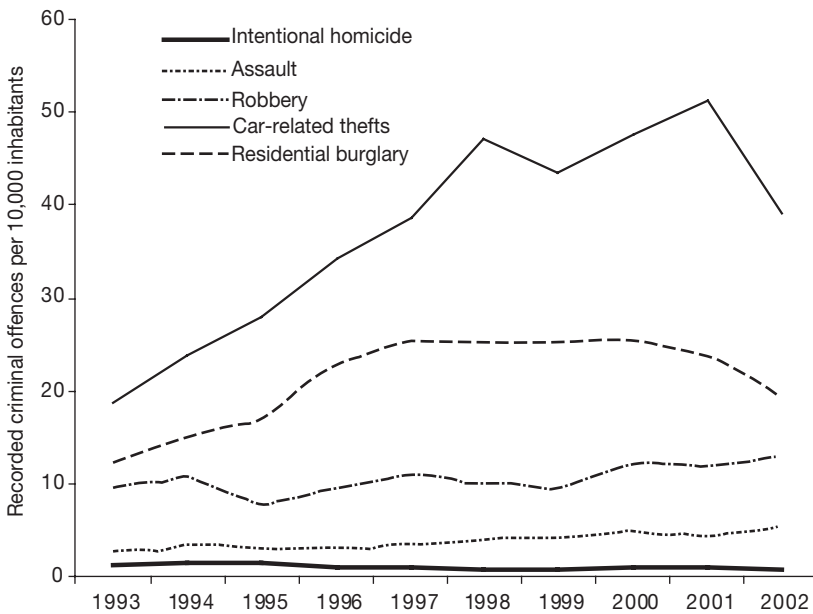
Figure 3 Selected recorded criminal offences per 10,000 inhabitants in Lithuania, 1993–2002.
Data Source: Ministry of Interior, 2005.

26.1 percent of the interviewed population claimed to be a victim of car-related theft. A smaller proportion reported being the victim of domestic burglary and violent crimes, such as robbery and assault. Car thefts and domestic burglary are more often reported to the police than most other types of crimes, probably to back up insurance claims. Van Wilsem et al. (2003) used data from the ICVS (all available countries) to show that, together with other East European countries, Lithuania had significantly higher victimization rates than the rest of Europe for theft and violence at the neighbourhood level.

Although the average increase in recorded criminal offences in non-border regions was higher than the increase in border regions in the 1990s,[7] the detailed pattern was far more complex (Table 1). The regions that experienced higher increases in recorded offences were the border regions of Visaginas and Mazeikiai, followed by the non-border regions of Telsiai and Birstonas. The regions that had the highest reduction in recorded crimes between 1993 and 2000 were Lazdijai and Salcininkai (border regions),

[7] The crime data used here were from 1993 to 2000. Since 2000 there have been changes in the way crime data are recorded (in 2003) and also modifications in the territorial units (in 2001), making comparisons based on the same regions difficult or impossible.

Table 1   Average percentage change in selected offences, border and non-border regions, 1993–2000

	Vehicle theft	Residential burglary	Assault	Robbery	Homicide	All reported offences
Border region	109.6	62.1	53.0	26.2	227.3	27.9
Non-border region	176.3	109.9	74.6	51.9	26.06	46.6
Total	136.3	84.1	62.8	17.5	−17.1	36.4

Note: The totals include data not only for territorial units (border and non-border) but also for departments.

and Kelme and Silale (non-border regions). There were also significant differences in the average increase in crime between towns and less urban districts. For instance, Vilnius, Kaunas and Klaipeda together averaged a 48 percent increase whereas their neighbouring less urban districts averaged only 11 percent. The processes that underlay these regional differences in crime ratios and trends in the 1990s will be explored further in a later section.

Beyond its national boundaries, Lithuania has been known as an origin country for the trafficking of women, and to a lesser extent as a transit country for cigarettes and drugs. Organized crime in Lithuania has changed in both quantity and quality over time. According to Gutauskas et al. (2004: 201), during the mid-1980s organized crime in Lithuania emerged with the attempts to liberalize state socialism by legalizing cooperative and individual property as a basis for economic activities. By the early 1990s the emphasis began to shift from illegal manufacturing to opportunistic criminality associated with the privatization of state property. This reached a mature phase by the turn of century, when patterns of organized crime had become less lethal and more sophisticated. Estimates in the early 1990s suggested that there were about 100 criminal groups in Lithuania and one-third of these groups had international links (Dapsys and Cepas 1998; Rawlison 2001), whereas in the late 1990s estimates suggested that there were about 30 groups. In the early 1990s, the illegal activities of these groups were regionally determined. In Klaipeda, Lithuania's main port, organized crime ran the smuggling of alcohol and drugs, whereas in Kaunas their main activity was vehicle theft and alcohol smuggling. Panevezys and Siauliai regions were dominated by a group renowned for extortion and violence (Rawlison 2001). Organized crime has, in its mature phase, followed the same spatial pattern as in the early 1990s, except that Kaunas has also become an important drug production

and distribution centre. Three of the most important regions for organized crime are the border regions of Vilnius, Klaipeda and Marijampole.

Characterization of the borders

The total number of criminal cases initiated by Lithuania Customs increased by 67 percent when comparing the first six months of 2001 with 2005 (Lithuania Customs 2005a). The most common cases detected by Customs involve smuggling activities, the illegal export of goods from Lithuania (e.g. alcohol, textiles, domestic electrical appliances, clothes, footwear, food products) and activities that involve fraud, including money counterfeiting (Figure 4). The discussion below, however, focuses on a selection of offences that have an effect that goes far beyond Lithuania's borders, namely (a) cigarette smuggling, (b) drug-related offences, and (c) human trafficking.

(a) Cigarette smuggling

Cigarettes are by far the most common commodity seized at the borders by the State Border Guard and Customs (Figure 4). Cigarettes comprise a large share of the smuggled goods confiscated at the Kaliningrad oblast and
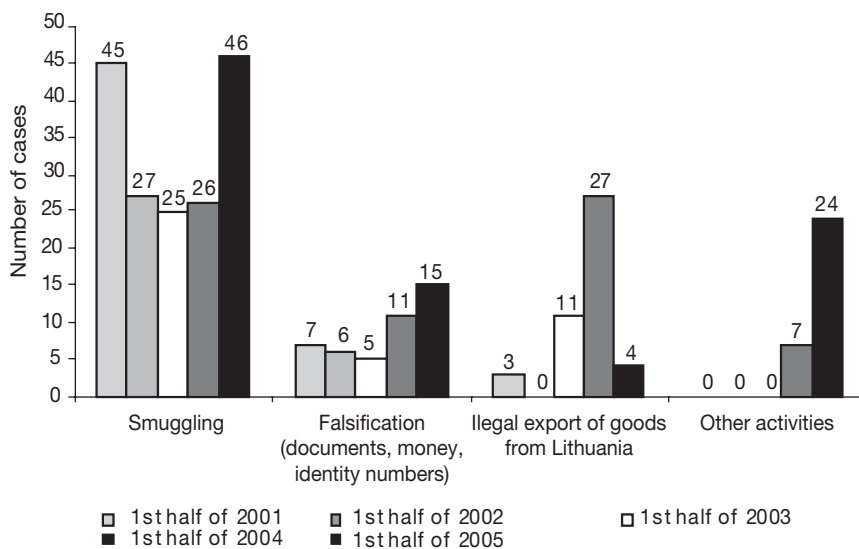

Figure 4   Pre-trial investigations (criminal cases) started by Lithuania Customs in 2001–4 (1st half) and 2005 (1st quarter), by crime type.

Source: Graph provided in digital format by Lithuania Customs, 2004.

Belarus borders. As many as five out of the six largest shipments of smuggled cigarettes detected at the Lithuanian borders by the Customs Criminal Service in 2003–4 came from Kaliningrad oblast. Usually cigarettes are manufactured by companies in Kaliningrad oblast and, after being smuggled to Lithuania, are either sold in the country (where the difference in price is about €0.5) or sent to other countries in Europe.[8] State Border Guard officials suggest that most of the tobacco seized is bound for the Lithuanian market, since it consists of relatively small quantities and is often transported by young people or residents of border zones, who are usually unemployed. However, it is uncertain whether the cigarettes that are seized at Lithuanian borders are a small or a large part of the total illegal European market. There is evidence that larger shipments pass undetected in the Baltic states and other East European countries (for example because of inadequate equipment for detection), reaching other destinations through large-scale smuggling schemes (Eisenberg and von Lampe 2005). The police and customs departments of Lithuania and other countries have worked together in detecting large amounts of smuggled cigarettes, as is partly reflected in the statistics for seizures (Figure 5). The increase may also reflect changes in the nature of smuggling. According to Lithuania Customs (2005a), after Lithuania's accession to the EU, a growth of cigarette smuggling has also been observed at both the Russian and the Belarus borders. Moreover, data from the State Border Guard suggest that the second half of 2004 was marked by arrests of Lithuanians who had smuggled large quantities of cigarettes. This increase in the involvement of local criminals is believed to be the result of the imprisonment of members of leading criminal groups who in the past used to smuggle cigarettes to Western Europe. Local criminal groups have seen this as an opportunity to engage in smuggling without competition.

(b) Drug-related offences

Increasingly drugs are both produced in Lithuania and brought into Lithuania for consumption there and for distribution to other countries (Gutauskas et al. 2004). According to UNODC (2004), Lithuania is the fifth most important source country for ecstasy and amphetamines, after the Netherlands and Belgium (together), Poland and Estonia. Over the period 1992–2002, seizures of amphetamine and ecstasy laboratories were also reported in all of the Baltic countries. The weakening of border controls within the EU means that Lithuanians have become more involved in

[8] For instance, the Customs Criminal Service detained a Lithuanian citizen at Medininkai road post carrying almost 8 million Russian cigarettes (770 boxes) from Belarus, which constituted about 25 percent of all seized cigarettes intercepted by the Customs Criminal Service in 2003 (Lithuania Customs 2005b).
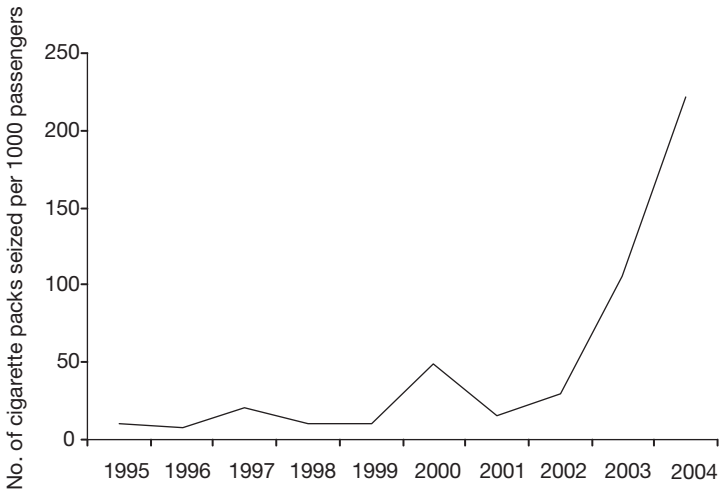
Figure 5   Seized goods per 1000 passengers travelling across Lithuanian borders, 1995–2004 (number of packs of cigarettes).
Source: State Border Guard database, 1995–2004.

drug business activities (Lithuania Customs 2005a) and also other crimes connected with them (Gutauskas et al. 2004).

(c) Human trafficking

A phenomenon less visible to Lithuanian border guards but perhaps more apparent to West European countries is human trafficking, particularly of young women from Lithuania. Various sources suggest that approximately 1500–2000 Lithuanian women are sold to brothels abroad each year. Germany, the Nordic States, the UK, Spain, Italy, Belgium, the Netherlands, Greece, the Czech Republic, Poland and Turkey are indicated as the main destinations (BKA 2002; Rigspolitiet 2004). Despite the efforts made by public authorities and institutions and by non-governmental and inter-national organizations to stop human trafficking, there are indications that it is increasing (Table 2). This rise in detected cases might reflect an actual increase in the number of people smuggled or else more restrictive controls on travellers at the borders. An analysis of the State Border Guard database from the mid-1990s up to 2004 indicates that Lithuanian borders are becoming, as suggested, more restrictive, particularly for those coming from the East. For instance, both the number of immigrants applying for asylum in Lithuania and the number refused entry drastically increased between 1997 and 2004. The same trend in applications and refusals is found after controlling either for the total number of persons physically checked in each year from 1995 to 2004 or for the number of officers working at the border in each year between 2000 and 2004.

Table 2   Data on human trafficking 1999–2004

Year	Cases (total)	Cases referred to court	Cases examined in court	Suspects	Victims known to law enforcement	Victims	Convicted persons
1999	3	1	1	2	2		2
2000	5	3	3	3	2		3
2001	19	6	3	18	37	9	7
2002	17	10	3	26	23	16	6
2003	18	5	2	33	28	7	2
2004	22	13	4	25	31	23	14
Total	84	38	16	107	123	55	34

Source: Government of Republic of Lithuania (2005).
Note: Data based on Article 131(3) (before 2003 Penal Code) and Article 147 (after 2003 Penal Code).

Assessing the 'border effect' on crime

In this section I model the geography of a selected group of offences at regional level in Lithuania. The purpose is to assess whether a region's location at the border of the country plays a role in determining its level of crime, after controlling for contextual differences. Figure 2 provides a summary of the many factors that affect crime levels in this context.

Model estimation

I assess the impact of the border in two ways: (1) by including in the model a dummy variable (*Border*) indicating whether the region is at the border (Figure 2); and (2) by including in the model a variable describing the proportion of border crossing points per border line. For a list of the border crossing points, see Appendix 1. Demographic and socioeconomic characteristics are used as control variables and are described in Appendix 2.

There are two types of dependent variable in this study. The first is a measure of the risk of crime for each of Lithuania's regions: standardized offence ratios for the six selected offences in 2004 (this is the dependent variable used for Model 1 in Table 3). The second dependent variable is a measure of the change in the level of offences between 1993 and 2000 (this dependent variable is used for Model 2 in Table 3).

Standardization is a useful way to represent data for a set of areas that differ in size (absolute values would tend to overemphasize large areal units)

or where it is necessary to allow for differences in population characteristics (Haining 2003). The Standardized Vandalism Ratio (SVR) for district i is given by:

$$SVR(i) = O(i)/E(i) \times 100,$$

where $O(i)$ is the observed number of cases of an offence and $E(i)$ is the expected number of cases of the offence. In this analysis, an average offence rate for Lithuania was obtained by dividing the total number of offences by the total size of the chosen denominator. For each area i, this average rate is multiplied by the size of the chosen denominator in area i to yield $E(i)$. It is important to choose a denominator for calculating $E(i)$ that is relevant to the offence, accounts for size effects and yields robust and reliable rate estimates. In this analysis I have chosen the total population for most of the offences, the exception being thefts, for which the geographical area of the unit was used as a denominator.

If we take the individual municipalities as regions, more than half of the regions that had a higher relative risk for overall offences – observed offences were higher than expected given the chosen denominator – were located at the border (Appendix 3). It is also worth noting that there are regions (such as Palanga and Neringa, where there are health/holiday resorts) that receive a significant inflow of temporary population in the summer. Since crime ratios are calculated on the basis of the resident population, the risk of victimization might not be accurate for these regions. The relative risk for four out of the six offences was also slightly higher in border regions than in non-border regions, the exceptions being car-related thefts and robbery. A typical example was assault. There were 24 regions with a higher relative risk $(O(i) > E(i))$; 14 of them were located at the border or belonged to a border region (Appendix 3).

Modelling focused on two groups of offences. The first group was composed of offences related to the transition from a planned economy to a market economy, such as thefts (of all types) and burglaries. Such a transition is often associated with complex shifts in the type and level of economic activity and increasing inequalities. In economies such as the former Soviet republics, the process of decline in manufacturing industry cannot be dissociated from the process of privatization of state companies. Although the average annual growth rate in GDP per capita in Lithuania between 1990 and 2003 was 0.6 percent, 21 percent of the population were still regarded as low-income workers. On the one hand, high unemployment rates, especially among young people, have exacerbated inequalities and affected offending rates. In Lithuania, the youth unemployment rate reached 31 percent in 2001, which is higher than for its Baltic neighbours (Latvia 23 percent, Estonia 24 percent) and for many other European

countries (e.g. Germany 8 percent, France 18 percent) (EurLIFE Database 2005). On the other hand, the stocks of goods also rose in the 1990s. In the post-Soviet era, wealthier individuals travelled to the West and acquired Western goods (Iwaskiw 1996), increasing the stocks of 'new targets' for

Table 3 Results of the regression analysis: Y = standardized offence rates

Offences	Model	R^2	Border effect	Other	Unsolved problems
Assault	*Model 1* 2004 (square root) OLS –>Spatial Lag	13.2	*Border***(+)	*W_Assault***(+)	–
	Model 2 Proportional difference 2000–1993 (log)	14.5	–	*Male****(+)	–
Robbery	*Model 1* 2004 (square root) OLS –> Spatial Lag	26.6	–	*Beds****(+)	–
	Model 2 Proportional difference 2000–1993 (log)	13.6	*Border****(−) –		
Vehicle theft	*Model 1* 2004 (log) OLS	61.2	–	*Urban****(+) *Beds****(+)	–
	Model 2 Proportional difference 2000–1993	15.0	–	*Urban****(+)	Heteroscedasticity and lack of normality of residuals at 1%
Residential burglary	*Model 1* 2004 (log) OLS	11.3	–	*Munexp***(−)	Lack of normality of residuals at 5%
	Model 2 Proportional difference 2000–1993	5.4	–	*Beds**(+)	Lack of normality of residuals at 1%
All reported offences	*Model 1* 2004 (square root) OLS	16.7	–	*Urban**(+) *Munexp**(−)	Lack of normality of residuals at 1%
	Model 2 Proportional difference 2000–1993 (log) OLS	17.8	–	*Urban****(+)	–

Note: *W_Assault* is the lagged dependent variable of *Assault* in the Spatial Lag model.
*** Significant at 1% level, ** 5% level and * 10% level.

motivated offenders. Nowadays property crimes are fed by the constantly increasing amount and variety of goods that are available in the home country. There is, however, still an illegal market for goods from the West. For instance, there is evidence that stolen cars are transported to Lithuania from Germany, Poland, Holland, Belgium, Latvia, Estonia and the USA and then taken onward to Belarus, the Ukraine and Russia. Often the scheme involves insured cars; an 'owner' proves his car has been stolen in his home country and receives the insurance, and the car is sold in the East. There have also been cases in Lithuania in which the victim advertises a 'missing car' in the newspaper and waits for the thief to come forward. They agree on a certain amount of money (normally less than the market price) and the car is returned to its owner.

The second group of offences is associated with stress and social disorganization. Economic and political transition has been associated with uncertainty and social instability, which in Russia and East European countries have generated violence (Gavrilova et al. 2000; Pridemore and Spivak 2003). Processes of social change are reflected in population shifts resulting from changes in migration flows and from a low fertility rate combined with an ageing population (Statistics Lithuania 2005a). Changes in institutions also directly affect the supply of and demand for jobs, schools and health care across the country. Rapid change may weaken social control and it can generate anomic conditions that lead to greater pressure to commit crime (Bernburg 2002). Like other post-Soviet republics, Lithuania has adopted a market economy, which stimulates patterns of consumption that are not attained by all segments of society. This is expected to cause frustration arising from the discrepancy between the potential free market economy goals and the 'real' capacity to obtain them (for a comprehensive discussion on anomie, the role of institutions and crime, see Kim and Pridemore 2005). Evidence from Russia during the 1990s has shown that negative social change and poverty were associated with higher homicide rates (Pridemore 2002; Kim 2003). Thus, the expected border effect will be assessed as controlling for the following covariates:

1. *Age characteristics of the male population* (male population aged 10–25 years). It is expected that the risk of any offence is highest in areas with a large proportion of young males because they are regarded as potential offenders for both property and violent crimes. The demography of areas might also affect social interaction and hence crime rates. At the intra-urban level, LaGrange (1999), drawing on the work of Felson and Cohen (1980), points out that residents in early adulthood are likely to be absent from their homes more frequently and therefore guardianship may be substantially reduced.
2. *Urban population* (proportion of urban population). The literature has shown plenty of evidence that crime is more widespread in urban than in rural areas

(Christie et al. 1965) and tends to increase with the size of the urban community. In particular, robbery and residential burglary are heavily concentrated in larger cities (Skogan 1978) since urban areas offer greater opportunities for crime and have weaker social control (Wikström 1991).

3. *Socioeconomic status* (registered unemployed individuals in the working age population). Unemployment is an important determinant of property crime rates at the regional level (Raphael and Winter-Ebmer, 1999). At the intra-urban level, American and British studies have long associated poverty with disorder and crime (see, for example, the seminal work of Park and Burgess, 1933; Shaw and McKay, 1942, and later Kornhauser, 1978; Bursik and Grasmick, 1993). Indicators of absolute or relative deprivation (Burton et al., 1994) are known to negatively impact communities' social capital (Kennedy et al., 1998), social cohesion (Hirschfield and Bowers, 1997), and collective efficacy (Sampson et al., 1997), which are important for fostering social control and deterring crime. As suggested by strain/anomie theories (e.g., Merton, 1938; Agnew, 1992), inequality in the distribution of resources can motivate deprived individuals towards crime. Some of these motivated individuals would overcome blocked opportunities through theft/robbery or express frustration about their incapacity to reach these resources through violence.

4. *Socially oriented institutions* (hospital beds per 10,000 inhabitants, municipal budget expenditure on social benefits per capita). During the transition period towards a market economy, regions have differed in the way they invest in welfare and promote socially oriented institutions. Health care is an example. Lithuania is characterized by low social care expenditure (15 percent of GDP compared with 25–35 in West European countries) that is better supplied in urban areas, often reaching higher-income groups (Jurgelenas et al. 2005). Offenders would be most motivated to commit offences within the context of an unequal distribution of material resources and where there are fewer effects of socially oriented institutions. Crime becomes an option when 'social bonds' are weak and one's connection to society fails (Hirschi 1969). There is evidence that social institutions moderate negative structural effects and therefore help reduce crime (Pampel and Gartner 1995; Kim and Pridemore 2005).

The regression analysis was implemented using GeoDa 0.9.5-1 (Anselin 2003) because the software has regression modelling capabilities with a range of diagnostics that are not available in standard statistical packages. In order to test for spatial autocorrelation on the residuals, a row standardized binary weight matrix (*W*) was used that comprised non-zero entries where *i* and *j* refer to adjacent areas. The set of standardized offence ratios shows a highly skewed distribution. The raw ratios were transformed using the log or square root transformation to produce a data set more nearly normal. The unemployment rate was highly correlated ($r=0.8$) with local government expenditure on social benefits per capita and the unemployment rate was therefore excluded from the model. The models were initially fitted by ordinary least squares (OLS). Although the variable for hospital beds indicated some correlation with the proportion of the

population in urban areas, both variables were retained since this does not lead to multicollinearity. The models show significant covariates explaining variation between areas in ratios of vehicle theft, residential burglary, assault and robbery (homicide was an exception). For vehicle theft and robbery, the models' diagnostics revealed significant unsolved problems of the residuals. Spatial autocorrelation on residuals of the model of assault ratios was addressed by using a spatial lag model (see Haining 2003 for a discussion of when it is appropriate to consider this model) using the matrix *W*, which takes the form of a lag operation on the response variable.

Results

Out of the six selected offences, only ratios of assault are affected by the 'border effect' in 2004 (Model 1). This means that being at the border increases one's relative risk of becoming a victim of assault. Although only 13 percent of the variation in assault ratios is explained by the model, results indicate that bordering regions tended to have a relatively higher risk than the interior regions in 2004 (Table 3, Appendix 3). For most of the selected offences, the models showed no effect of the border either on the offence ratios in 2004 or on their change between 1993 and 2000. The exception is robbery, owing to the fact that regions located at the border contributed to a decrease in the number of robberies between 1993 and 2000. It is impossible to ascertain at an individual level the processes that link borders and assault or robbery. However, at an aggregate level, findings provide evidence of linkages suggested by both hypotheses 2 and 3 (Figure 2). More assaults in border regions could, for instance, be related to the convergence of motivated offenders and victims. People travelling through the border region could be more at risk because they are exposed to unfamiliar circumstances; for offenders, being unknown in a place might reinforce their decision to engage in a violent act. Violence could also be an indicator of other illegal activities occurring both near and at the borders (e.g. violence between groups competing for smuggling markets). On the other hand, and less interestingly, it could be the result of a more intensive social and police control policy.

The variable for assault was also significant in its lagged form, an indication that the processes associated with it go beyond each individual region but are close to Lithuania's densely populated areas. The highest standardized assault ratios are found from Salcininkaiand Vilnius (the border with Belarus) to Silute and Klaipeda (the Kaliningrad oblast–Baltic Sea border) passing through Kaunas. Note also that areas that experienced the highest increase in assault (Figure 6) are clustered in space, often following the transportation corridors (Figure 1), either from border to border following 'axes'

(from Vilnius/Belarus to Marijampole/Poland passing through Kaunas, or from Jurbarkas /Kaliningrad oblast to Birzai/Latvia, passing through Panevezys) or concentrated in the north-west of the country.

As Model 2 shows, regions with a high proportion of males aged 10–25 had higher increases in assault. Despite the fact that border regions had relatively more assaults between 1993 and 2000 and that one-third of Lithuanian regions with a relatively high share of young males are located at the border (e.g. Skuodas, Silute, Klaipeda, Palanga, Vilnius), the 'border' itself did not significantly affect *changes* in assault. One reason may be that the average proportion of juveniles (14–17 years old) charged with criminal offences in Lithuania varied very little in the 1990s (around 15 percent) (CCPL 2005). Another reason may be changes in the share of youngsters involved in assaults in border regions. In 1993, offenders involved in assault tended to be young (aged 14–25), particularly in border regions (e.g. Palanga and Druskininkai). In 2000, the proportion of youngsters among offenders involved in assaults not only slightly decreased but also did not differ between regions.

As expected, crime is more widespread in urban than in rural areas in Lithuania. The proportion of people living in urban areas is by far the most important covariate in explaining offence ratios or changes in offences between 1993 and 2000 at a regional level. This is also confirmed by the significance of the variable for hospital beds per 10,000 inhabitants, since people living in more urban regions are also closer to hospitals. This means
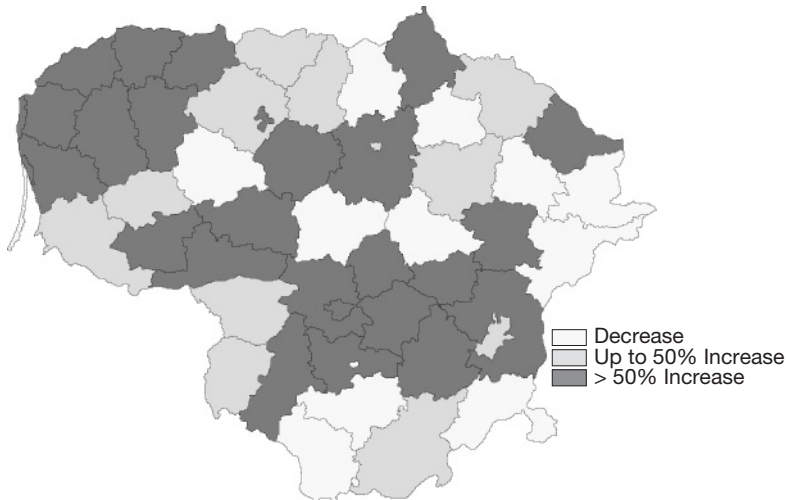

Figure 6   Changes in assaults, 1993 to 2000.
Note: Data for the cities of Marijampole and Alytus as individual geographical units were not available.

that, contrary to my intention, the variable for hospital beds per 10,000 inhabitants did not function as an indicator of the moderating effect of social institutions on negative structural developments (including crime). Instead, the variable functions as a proxy for *urbanity* (as opposed to *ruralness*), which is associated with opportunities for crime, particularly property crime. As much as 61 percent of the variation in ratios of vehicle theft (the highest risk was in Kaunas, Klaipeda, Palanga and Silute) could be explained by these two covariates alone. Much of the variation in standardized robbery ratios (26.6 percent) and changes in residential burglary levels in the 1990s is also explained by hospital beds per 10,000 inhabitants.

The fact that urban areas explain the regional geography of a selected group of crimes in Lithuania may also be associated with the nature of organized crime, which is mostly an urban phenomenon (see Gutauskas et al. 2004: 211). Although causal mechanisms cannot be described at this aggregate level of analysis, for certain crimes the link is quite evident. The regions with the highest risk of car thefts in 2004 were all town municipalities, such as Panevezys, Kaunas, Klaipeda, Siauliai and Vilnius. At least one of them – Kaunas – is a known centre for gangs specializing in car thefts (see, e.g., Rawlison 2001). Klaipeda, where organized crime groups ran smuggled alcohol and drugs, also had a relatively high standardized assault ratio in 2004.

Local expenditure on social benefits per capita as an indicator of socially oriented institutions has the expected effect on variations in ratios of both residential burglary and total reported offences. However, it is very difficult to ascertain how it actually affects crime. On the one hand, the Mazeikiai and Salcininkai regions are examples where a slightly higher budget expenditure on social benefits per capita seems to have a decreasing impact on offence ratios. In the case of Mazeikiai, the oil refinery might also have an effect on local investments and unemployment rates. However, the local expenditure on social benefits per capita was correlated with unemployment, which partially explains these regions' high social costs. There are indications that the regions' ethnic composition together with economic crisis has generated large numbers of long-term unemployed as a proportion of the local labour force (e.g. Poles in Salcininkai and Russians in Visaginas). On the other hand, the Akmene region has a relatively high unemployment rate, and therefore high expenditure on social benefits per capita, but relatively low offence ratios. These findings may indicate two distinct processes. The first could be associated with the expected effects that social investments have in restraining crime by promoting welfare in the region and moderating the negative influences of structural factors such as poverty and unemployment. The second process is especially related to property crimes. High unemployment means less consumption and therefore fewer crime targets.

Final considerations

The results reported here suggest that there are variations in the levels of offences and their geography within Lithuania. For instance, the measure of relative risk was slightly higher in border regions for overall offences and for four out of six selected crimes. In other words, border regions more often had an observed offence rate higher than that expected when taking into consideration the crime distribution for the whole country. Despite the fact that the highest average increases in recorded criminal offences were found in two border regions, on average non-border regions showed higher increases in the 1990s. This partially explains why only assault, out of the six selected offences, shows an increase owing to the 'border effect', and robbery shows a decrease.

Findings show that having a high proportion of crossing points on a border has no effect on crime. The impact of the border on the crime levels of each region was assessed by including in the model both a dummy variable for units located at the border and a variable reflecting proportions of border crossing points per border line. This excluded airports, which may have underestimated the vulnerability of these regions to higher crime levels. New methods of assessing the effects of borders might be tested in future studies; possibilities include weighting each border by its flow of passengers and vehicles. In the current model, all crossing points have the same weight. New covariates such as density of police forces should be incorporated into the model to test regional and local differences in police control policies.

Crime levels and their geography were highly determined by whether the area was urban or rural and by other covariates that correlated with that (e.g. number of hospital beds per capita). A remaining question is what mechanisms explain urban areas' vulnerability to crime in Lithuania. This study is an example of how aggregate regional indicators often available from national agencies can be used to try to explain the geography of a group of selected offences. It cannot therefore establish the mechanisms at the individual level that generate such a pattern. Assessing the impact of intra-urban structure and population differences within the main important cities in Lithuania could be the next step in future research at city level. An interesting question would be whether or not intra-urban crime patterns in East European cities differ from those found in West European or US cities. Moreover, little is known about levels of crime and their patterns in rural areas and their hinterland. Since nearly one-third of the Lithuanian population lives in areas regarded as rural, research of this kind would be relevant for policy intervention on crime at the regional level. For instance, there is evidence of crime clusters following transportation axes connecting the densest urbanized areas. Still in this context, an outstanding question is

to what degree organized crime in border regions interacts with domestic local crime. Findings here suggest some links but only case studies of particular offences (e.g. thefts and contraband of cars) are able to establish such links.

Although local expenditure on social benefits per capita shows the expected effects on variations in ratios of crime (for residential burglary and for total offences) these findings cannot *alone* be regarded as evidence that socially oriented institutions have a moderating effect on crime. The reason is that expenditure on social benefits per capita showed some correlation with the unemployment rate. For future research, other indicators that show how much public money is spent on welfare, and how it is spent, should be tested. Given a relatively high unemployment rate among young people in Lithuania, a relevant indicator would for instance be municipal expenditure on labour market programmes aimed at improving young people's skills.

This article contributes to the way regional variations in crime levels and their geography are analysed. It is innovative in its exploration of different types of data sources. Although certain data sources could not be linked to each geographical unit (e.g. the victimization survey) or encompass a comparative long-term frame for analysis (e.g. police records or border data), the study does attempt to provide an overview of Lithuania's crime conditions by searching for similar (or diverging) patterns in different sources of data. Another important feature of this study is the incorporation of the 'spatial dimension of crime', which is often missing in comparative criminology. Using a geo-referenced crime database and Geographic Information Systems, a selected group of offences were standardized and later modelled using a spatial statistical tool. Standardization provides a useful way of representing data for a set of areas that differ in size or for which it is necessary to allow for differences in population characteristics between areas. The spatial statistical software used here is provided with a full range of diagnostics, including tests for checking for spatial autocorrelation on residuals, which are important in spatial analyses and are often missing from standard statistical packages.

However, the analysis shares limitations with other comparative analysis of crime in a transition country, which are important to mention here. Although this article recognizes that Lithuanian crime data have improved in quality since independence, little is documented about data quality in Lithuania (e.g. resulting from differences in the structure of the police commissariats, regional ethnic differences that complicate the implementation of new recording systems, or technological barriers). Most of the major changes in the system are well known (e.g. changes in the penal code or in recording systems) but the difficult part is to estimate how minor

(perhaps local) changes affect levels of recording. Despite these limitations, the results from this study can enhance current research on regional variation in crime by providing empirical evidence from an East European country.

Appendix 1–Border crossing points

Lithuania – Latvia	*Lithuania – Belarus*	*Lithuania – Poland*	*Lithuania – Russian Federation*	*Sea borders*
1. Bugeniai – Vairode (railway)	1. Adutiškis – Lentupis (railway)	1. Kalvarija – Budzisko	1. Jurbarkas – Sovctsk (river)	Klaipeda National Port (Kuršių Molb and Matkų border crossing points) and Būtinges Oil Terminal border crossing point
2. Būknaičiai – Ezcre	2. Adutiškis – Motdcvičiai	2. Lazdijai – Ogrodniki (Aradninkat).	2. Kybanai – Černyševskojc	
3. Buattnge – Rucava	3. Adutiškis – Pastovys (railway)	3. Mockava Šcštokai) – Trakišzki (Trakiškes) (railway)	3. Kybaflai – Nesterov (railway)	
4. Germaniškis – Skaistkalne	4. Druskininkai – Paricéé point (railway)		4. Nida – Morskoje	
5. Gesalai – Aizviķi	5. Eišiškés – Dotiškts		5. Nida – Rybaěyj (river)	
6. Joneliai – Brunava	6. Geledné – Lentupis (railway)		6. Pagégiai – Sovetsk (railway)	
7. Joniškis- Mcitene (railway)	7. Kabeliai – Parieče (railway)		7. Panemune – Sovelsk	
8. Juodupis – Aknisic	8. Kapčiamiestis – Kadyš		8. Ramoniškiai – Pogriniěnyj	
9. Kalviai – Meitene	9. Kena – Gudagojis (railway)		9. Rusne – Soveisk (river)	
10. Klykoliai – Pricdula	10. Krakūnai – Gcranainys			
11. Kvctkai – Pilskslne	11. Latčzcris – Parieče			
12. Laižuva – Laižuva	12. Lavoriškés – Koilovka			
13. Lcnkimai – Lankuti	13. Mcdininkai – Kamcnyj Log			
14. Luknė– Lutne	14. Papelckis – Lcntupis			
15. Mažcikiai – Reņge (railway)	15. Raigardas – Privalka			
16. Obcliai – Egtaine (railway)	16. šalčininkai – Benekainys			
17. Obetiai – Sub lic	17. Stasylos – Benekainys (railway)			
18. Pilcliai – Piķcḷntuiža	18. šumskas – Loša			
19. Puodžitūnai – Kricvgali	19. Tvcrcěius – Vidžai			
20. Saločiai – Grcnctālc	20. Urcliai – Klcvyěia			
21. Skuodas – Plūdoni				
22. Skuodas – Prickulc (railway)				
23. Smelyne – Medumi				

(*continued*)

Appendix 1: (*continued*)

24. Stclmuže – Rauda
25. Streliškiai –
    Vainode
26. Suvainiskis –
    Nereta
27. Tilžė – Dcrmene
28. Turmantas –
     Kurcums (railway)
29. Turmanlas –
    Zemgale
30. Vegeriai – Vltiņi
31. Žagaré – Žagarc
32. Žcimclis – Adžūni

Source: Data provided in digital format by State Border Guard Police, 2005.
Note: Number of crossing points = 72 (64 at land borders, 4 at sea borders, 4 air borders).

Appendix 2–Characteristics of the data set

Type of data	*Description*	*Year*	*Source*
Offences	Total recorded offences	2004;	Ministry of Interior,
	Vehicle theft	1993 and	Statistical Data
	Residential burglary	2000	Division
	Assault		
	Robbery		
	Homicide		
Demographic and	Proportions of		
socioeconomic	Urban population (*Urban*)	2004	Statistics Lithuania
indicators	Young male population, aged		
	10–25 years (*Male*)	2004	
	Registered unemployed individuals		
	in the working age population	2004	
	(*Unemp*) Hospital beds per 10,000		
	population (*Beds*)	2003	
	Municipal budget expenditure		
	on social benefits per capita (*Munexp*)	2004	
Border effect	Dummy for border, border = 1, 0		
	otherwise (*Border*)		
	Proportion of crossing points per		
	border line (*Crosspoint*)		

Appendix 3–Regions with higher risk for offences, 2004

Offence type	Border regions with $O(i) > E(i)$	No. of regions with $O(i) > E(i)$
Total offences	Klaipeda city, Klaipeda, Silute, Vilnius city, Vilnius, Palanga city, Neringa city	12
Vehicle theft	Palanga city, Klaipeda city, Vilnius city, Marijampole	8
Residential burglary	Palanga city, Klaipeda, Klaipeda city, Neringa city, Silute, Vilnius, Vilnius city	15
Assault	Akrnene, Mazeikiai, Rokiskis, Zarasai, Klaipeda, Ignalina, Klaipeda city, Neringa city, Silute, Jurbarkas, Vilnius, Sakiai, Vilnius city, Salcininkai	24
Robbery	Siauliai city, Panevezys city, Ukmerge, Jonava, Kaunas city	9
Homicide	Birzai, Akmene, Mazeikai, Joniskis, Pakruojis, Rokiskis, Kretinga, Ignalina, Klaipeda city, Silute, Svencionys, Jurbarkas, Vilnius, Salcininkai, Varena	25

Acknowledgements

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