Cycles of violence, and terrorist attacks index for the State of Ohio

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Abstract: I apply the Beveridge-Nelson business cycle decomposition method to the time series of per capita murder in the State of Ohio. (1933-2005). Separating out "permanent" from "cyclical" murder, I hypothesize that the cyclical part coincides with documented waves of organized crime, internal tensions, crime legislation, social, and political unrest, and recently with the periodic terrorist attacks to the U.S. The estimated cyclical component of murder warns that terrorist attacks against the U.S. have affected Ohio creating estimated turning point dates marked by the most tragic terrorist attacks to the nation: the World Trade Center Bombing in 1993, and 9/11 2001. This paper belongs to the series of papers helping the U.S identify the closeness of terrorist attacks, and constructs the attacks index for Ohio. Other indices constructed include the Index for the U.S. http://mpra.ub.uni-uenchen.de/1145/01/MPRA_paper_1145.pdf, New York State http://mpra.ub.uni-muenchen.de/3776/01/MPRA_paper_3776.pdf, New York City http://mpra.ub.uni-muenchen.de/4200/01/MPRA_paper_4200.pdf, Arizona State http://mpra.ub.uni-muenchen.de/4360/01/MPRA_paper_4360.pdf, Massachusetts State http://mpra.ub.uni-muenchen.de/4342/01/MPRA_paper_4342.pdf., California http://mpra.ub.uni-muenchen.de/4547/01/MPRA_paper_4547.pdf. Washington http://mpra.ub.uni-muenchen.de/4604/01/MPRA_paper_4604.pdf., and Arkansas. These indices must be used as dependent variables in structural models for terrorist attacks and in models assessing the effects of terrorism over the U.S. economy.

Keywords: A model of cyclical terrorist murder in Colombia, 1950-2004. Forecasts 2005-2019; the econometrics of violence, terrorism, and scenarios for peace in Colombia from 1950 to 2019; scenarios for sustainable peace in Colombia by year 2019; decomposing violence: terrorist murder in the twentieth in the United States; using the Beveridge and Nelson decomposition of economic time series for pointing out the occurrence of terrorist attacks; decomposing violence: terrorist murder and attacks in New York State from 1933 to 2005; terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries.

JEL classification codes: C22, D74, H56, N46, K14, K42, N42, O51.
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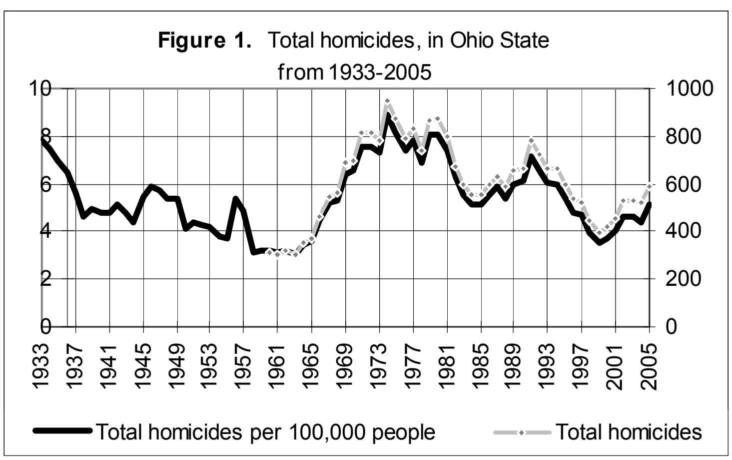
1. Introduction.

After decomposing violence, and creating the cyclical terrorist murder and attacks index for the United States (Gómez-Sorzano 2006), and *terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries* (Gómez-Sorzano 2007B), this paper continues that methodology research applied at the State level. The current exercise for Ohio State is the sixth one at decomposing violence at the state level on the purpose of constructing murder and attacks indexes preventing the closeness of attacks or tragic events. This research shows that the estimated cyclical component of murder pointed out the occurrence date of the last terrorist attacks against the U.S, particularly, the World Trade Center bombing in 1993, and 9/11 2001.

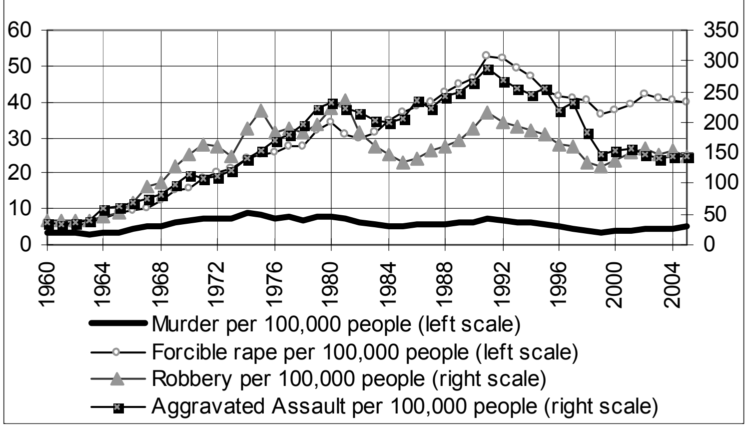
According to the Federal Bureau of Investigation, Uniform Crime Reporting System, total homicides in Ohio State increased from an average of 421 per year in the 1960s to 816 in the 1970s, 651 in the 1980s, and 600 in the 1990s (Fig. 1), for year 2005 the State reported 585 homicides.

When adjusted for population growth, i.e., homicides per 100,000 people in the population, peaks are found in 1933, 1946, 1956, 1971, 1974, 1980, 1991, and 2005 with values of 8 murders per capita, and 6, 5, 8, 9, 8, 7 respectively for those years, and 5 for 2005.



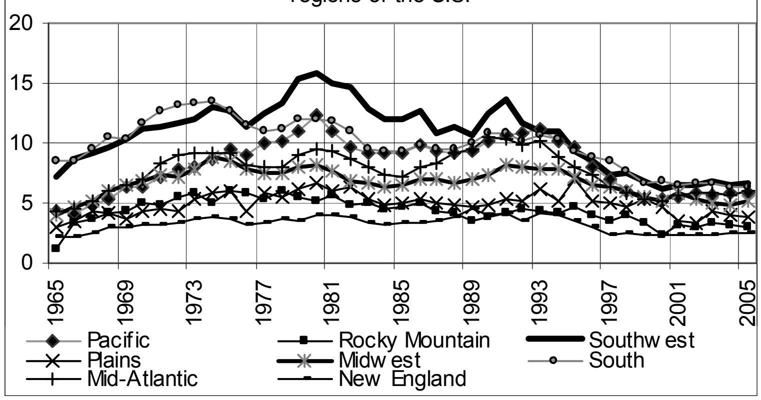
Out of the state's four categories of crimes, measuring violent crime (murder, forcible rape, robbery, and aggravated assault) murder is the one that varies the less showing a slight growing tendency (Fig. 2).

Figure 2. Categories of violent crime in Ohio State



Although the U.S., murder rates appear stabilizing during the last years, the highest per capita rates are found in the southwest and, south regions with 6.67 and 6.39 per capita, the Midwest region where Ohio belongs appears as the fifth highest rate across the nation with a rate of 5.11 for 2005 (Fig. 3).

Figure 3. Murder per capita rates per 100,000 across regions of the U.S.



2. Data and methods

The Bureau of Justice Statistics has a record of crime statistics that reaches back to 1933, (for this analysis I use the murder rates per 100,000 people[1]). As is known, time series can be broken into two constituent components, the permanent and transitory component. I apply the Beveridge-Nelson (BN for short 1981) decomposition technique to the Ohio State series of per capita murder.

[1] Taken from FBI, Uniform Crime Reports.

Beveridge and Nelson decomposition

I use the augmented Dickey Fuller (1981), tests to verify the existence of a unit root on the logarithm of murder 1933-2005. These tests present the structural form shown in equation (1).

$$\Delta L\,\mathrm{hom}_t = \alpha + \theta.\,t + \phi\ L\,\mathrm{hom}_{t-i} + \sum_{i=1}^{k} \gamma_i\ \Delta L\,\mathrm{hom}_{t-i} + \varepsilon_t \qquad (1)$$

The existence of a unit root, is given by (phi) ϕ=0. I use the methodology by Campbell and Perron (1991), in which an auto-regression process of order k is previously selected in order to capture possible seasonality of the series, and lags are eliminated sequentially if: a) after estimating a regression the last lag does not turn out to be significant, or b) if the residuals pass a white noise test at the 0.05 significance level. The results are reported on table 2.

Table 2 Dickey & Fuller test for Unit Roots

	K	Alpha	Theta	Phi	Stationary
D(Lhohio) – per capita murder series	29	1.6218	0.0077	-1.20	Yes
Ohio State , 1933-2005		4.009	2.7955	-3.82	

Notes: 1. K is the chosen lag length. T-tests in second row, refer

to the null hypothesis that a coefficient is equal to zero.

Under the null of non-stationarity, it is necessary to use the Dickey-Fuller critical value that at the 0.05 level, for the t-statistic is -3.50 , -3.45 (sample size of 50 and 100)

After accepting the null for a unit root (accepting the series is stationary), I technically can not perform the BN decomposition[2] which begins by fitting the logarithm of the per capita murder series to an ARIMA model of the form (2):

$$\Delta Lt\,\mathrm{hom}_t = \mu + \sum_{i=1}^{k} \gamma_i \Delta Lt\,\mathrm{hom}_{t-i} + \sum_{i=1}^{h} \psi_i \varepsilon_{t-i} + \varepsilon_t \qquad (2)$$

Where k, and h are respectively the autoregressive and moving average components. The selection of the ARIMA model for Ohio was computationally intense, I was however able to find an excellent ARIMA (28, 1, 20) estimated with RATS 4, whose results are reported on table 2.

[2] Although according to Beveridge and Nelson (1981), the data series should be non-stationary for performing the procedure, I proceeded with it, as I did for Arizona State finding an attacks index for Ohio that coincides with major attacks on U.S soil, and wars fought by the country.

Table 2. Estimated ARIMA model for per capita murder for Ohio State

Annual data from 1933 to 2005 -

Variables	**Coeff**	**T-stats**	**Std Error**	**Signif**
Constant	0.0642	3.547	0.0181	0.0000
AR(2)	0.3672	5.9771	0.0610	0.0000
AR(3)	0.1395	4.8917	0.0280	0.0000
AR(5)	0.3549	17.68	0.0200	0.0000
AR(9)	-0.2199	-7.43	0.0290	0.0000
AR(28)	-0.6321	-8.25	0.0760	0.0000
MA(5)	0.5521	2.73	0.2019	0.0000
MA(6)	3.1944	20.58	0.1551	0.0000
MA(10)	3.4420	11.38	0.3022	0.0000
MA(20)	1.5306	3.98	0.3838	0.0000

Centered R^2 = 0.9886

DW= 2.06

Significance level of Q = 0.00000

Usable observations = 44

The 10 model parameters from table 2 are replaced in the equation for the permanent component of murder shown in (3)[3]:

$$L\hom_t^{PC} = L\hom_0 + \frac{\mu . t}{1-\gamma_1 - . . . \gamma_k} + \frac{1+\Psi_1 + ...\Psi_h}{1-\gamma_1 - . . . \gamma_k} \sum_{i=1}^{t} \varepsilon_i \quad (3)$$

The transitory, terrorist murder estimate, or attacks index is found by means of the difference between the original series, and the exponential of the permanent per capita component ($L\hom_t^{PC}$)[4], and is shown on figure 4 that additionally shows its permanent component of murder. The attacks index for Ohio matches the qualitative description of known waves of organized crime, internal tensions, crime legislation, social, and political unrest overseas, and disentangles, and presents the cycles of violence in the State. To compare this historical narrative of events with my estimates for cyclical terrorist murder and, attacks I use chronologies, and description of facts taken from Clark (1970), Durham (1996), Blumstein and Wallman (2000), Bernard (2002), Hewitt (2005), Monkkonen (2001), Wikepedia, the Military Museum, and Henrreta et al. (2006).

[3] The extraction of permanent and cyclical components from the original series is theoretically shown in BN (1981), Cuddington and Winters (1987), Miller (1998), Newbold (1990), and Cárdenas (1991). I show the mathematical details for the U.S.' case in appendix A. Eq.3 above, turns out to be Eq.17 in appendix A.

[4] Turning the estimated permanent per capita component into the level of the permanent component.

Figure 4. Cyclical terrorist murder and attacks index for Ohio State from 1962 - 2005

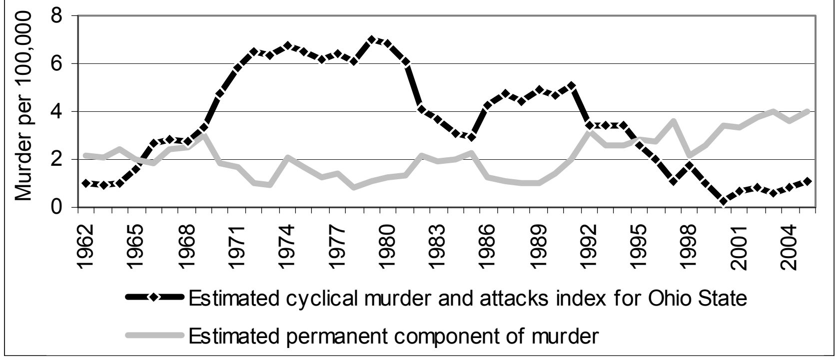
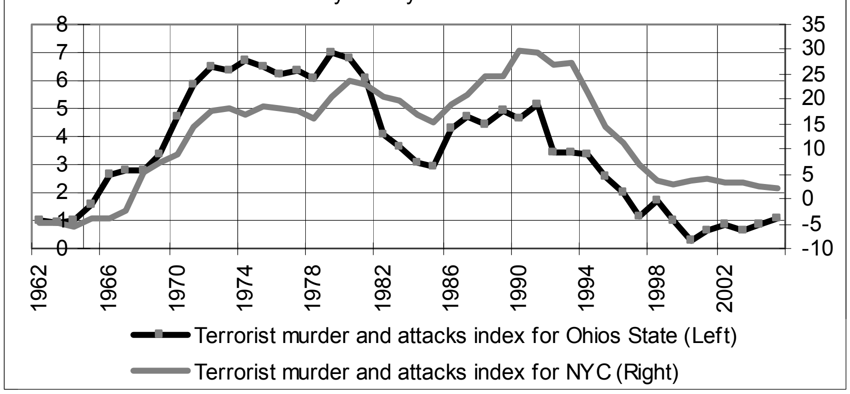


Figure 5 for information purposes, presents jointly the terrorist attacks index for the State of Ohio, and New York City.

Figure 5. Terrorist murder and attacks index for Ohio State and New york City from 1962 to 2005

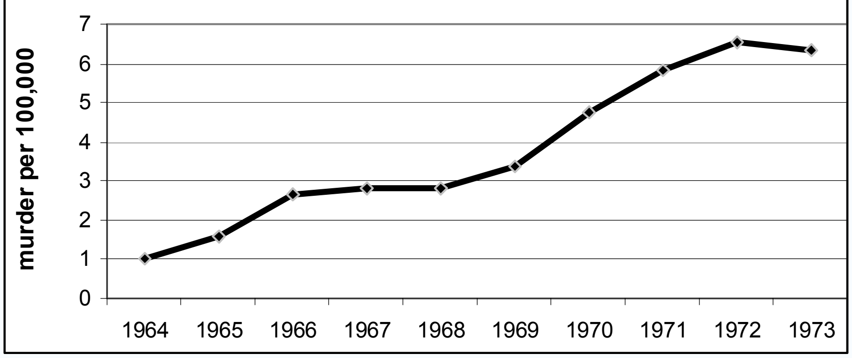


3. Interpretation of results.

I have been able to surpass the technical difficulties, and have split the per capita series for Ohio State finding both, its terrorist attacks index and its permanent component of murder.

The assassination of President Kennedy in 1963 did not affect the index where it still decreased from 1.01 in 1962 to 0.91 in 1963. The entrance to the Vietnam Conflict in 1964 jumped the index from 0.91 in 1963 to 1.01 in 1964 (10.98%), afterwards it started slowly going up getting a peak in 1972 with 6.52, and then decreased by its end in 1973 with 6.33 (-2.9%), figure 6.

Figure 6. The terrorist attacks index for Ohio State during the Vietnam Conflict 1964 - 1973



In 1965 the year of the shut down in power in NYC jumped the index from 1.01 in 1964 to 1.58 in 1965. Neither the assassination of Dr. Martin Luther King Jr, nor the military operation in Los Angeles in 1992 jumped this index.

A strong ascension is noted for 1991, where the index moved from 4.67 in 1990 to 5.12 in 1991 (9.6%). Durham (1996, pp.1) reported that crimes of heinous nature dominate the national evening news around the country by the end of 1992, citizens reported this year 14.4 million offenses to law enforcement agencies around the country, meaning more than 5 percent of Americans were victimized by crimes, statistics also suggested that law enforcement agencies cannot keep up with the tide of crime, during this year only 21 percent of the offenses reported were cleared by arrest, according to the FBI, Uniform Crime Reporting System, someone was murdered every 22 minutes, robbed every 47 seconds, and raped every 5 minutes.

The Ohio index as mentioned earlier captured the increased pressure felt across the nation as a consequence of the World Trade Center bombing, and 9/11 attacks where it moved from 3.42 in 1992 to 3.44 in 1993 (0.58%), while for 9/11 it jumped from 0.26 in year 2000 to 0.62 in 2001 (138.4%). From year 2002 onwards it ascends steadily getting a value of 0.85 for 2004 and 1.08 in 2005 (27%).

4. Conclusions.

Provided with a data series of per capita murder from 1933 to 2005, I have constructed both the attacks and the permanent murder indices for Ohio State. The index works amazingly well at pointing out disasters and terrorist attack dates for NYC as affecting itself; it particularly foretold with precision recent tragic events occurred in the U.S as the World Trade Center bombing and 9/11 attacks. The Ohio index for terrorist attacks appears climbing. It is required immediate research towards the construction of model for permanent murder and attacks.

Data Source: FBI, Uniform Crime reports. United States Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.

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Appendix A. The Beveridge & Nelson decomposition of economic time series applied to decomposing the Ohio State per capita homicides from 1933 to 2005.

I denote the observations of a stationary series of the logarithm of per capita homicides for Ohio State. by *Lthom* and its first differences by W_t. Following Beveridge & Nelson, BN for short, (1981, p.154), many economic times series require transformation to natural logs before the first differences exhibit stationarity, so the W_t's, then are continuous rates of change.

$$W_t = Lt\hom_t - Lt\hom_{t-1} \qquad (1)$$

If the w's are stationary in the sense of fluctuating around a zero mean with stable autocovariance structure, then the decomposition theorem due to Wold (1938) implies that W_t maybe expressed as

$$W_t = \mu + \lambda_0\varepsilon_t + \lambda_1\varepsilon_{t-1} + \ldots, \quad where\ \lambda_0 \equiv 1 \qquad (2)$$

Where, μ the $\lambda's$ are constants, and the $\varepsilon's$ are uncorrelated disturbances. According to BN, the expectation of $Lt\hom_{t+k}$ conditional on data for $Lt\hom$ through time t is denoted by $Lt\hat{\hom}(k)$, and is given by

$$\begin{aligned} Lt\hat{\hom}(k) &= E(Lt\hom_{t+k} \mid \ldots\ldots, Lt\hom_{t-1}, Lt\hom_t) \qquad (3) \\ &= Lt\hom_t + E(W_{t+1} + \ldots W_{t+k} \mid \ldots, W_{t+1}, W_t) \\ &= Lt\hom + \hat{W}_t(1) + \ldots + \hat{W}_t(k) \end{aligned}$$

Since the $Z_t's$ can be expressed as accumulations of the $W_t's$. Now from (2) it is easy to see that the forecasts of W_{t+i} at time t are

$$\hat{W}_t(i) = \mu + \lambda_i \varepsilon_t + \lambda_{i+1}\varepsilon_{t-1} + \ . \ . \ . \ . \ . \tag{4}$$

$$\mu + \sum_{j=1}^{\infty} \lambda_j \ \varepsilon_{t+1-j} \ ,$$

Now substituting (4) in (3), and gathering terms in each ε_t, I get

$$L\hat{\hom}_t(k) = L\hom_t + \hat{W}_t(i) \tag{5}$$

$$= L\hom_t + \left[\mu + \sum_{j=1}^{\infty} \lambda_j \varepsilon_{t+1-j}\right]$$

$$= k\mu + L\hom_t + \left(\sum_{1}^{k} \lambda_i\right)\varepsilon_t + \left(\sum_{2}^{k+1} \lambda_i\right)\varepsilon_{t-1} + . \ . \ . \ .$$

And considering long forecasts, I approximately have

$$L\hat{\hom}_t(k) \cong k\mu + L\hom_t + \left(\sum_{1}^{\infty} \lambda_i\right)\varepsilon_t + \left(\sum_{2}^{\infty} \lambda_i\right)\varepsilon_{t-1} + . \ . \ . \ . \ . \tag{6}$$

According to (6), it is clearly seen that the forecasts of homicide in period (k) is asymptotic to a linear function with slope equal to μ (constant), and a level $L\hom_t$ (intercept or first value of the series).

Denoting this level by $\overline{L\hom_t}$, I have

$$\overline{L\hom_t} = L\hom_t + \left(\sum_{1}^{\infty} \lambda_i\right)\varepsilon_t + \left(\sum_{2}^{\infty} \lambda_i\right)\varepsilon_{t-1} + \ . \ . \ . \ . \ . \ . \ . \qquad .(7)$$

The unknown μ and $\lambda's$ in Eq. (6) must be estimated. Beveridge and Nelson suggest and ARIMA procedure of order (p,1,q) with drift μ .

$$W_t = \mu + \frac{\left(1-\theta_1 L^1 - . \ . \ . - \theta_q L^q\right)}{\left(1-\varphi_1 L^1 - . \ . \ . - \phi_p L^p\right)}\varepsilon_t = \mu + \frac{\theta(L)}{\varphi(L)}\varepsilon_t \tag{8}$$

Cuddington and Winters (1987, p.22, Eq. 7) realized that in the steady state, i.e., L=1, Eq. (9) converts to

$$\overline{L\hom_t} - \overline{L\hom_{t-1}} = \mu + \frac{(1-\theta_1 - \ . \ . \ . \ \theta_q)}{(1-\phi_1 - . \ . \ . \varphi_p)}\varepsilon_t = \mu + \frac{\theta\,(1)}{\varphi\,(1)}\varepsilon_t \quad (9)$$

The next step requires replacing the parameters of the ARIMA model (Table 2) and iterating Eq.(9) recursively, i.e., replace t by (t-1), and (t-1) by (t-2), etc, I get

$$W_t = \overline{L\hom_t} - \overline{L\hom_{t-1}} = \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_t \qquad (10)$$

$$W_{t-1} = \overline{L\hom_{t-1}} - \overline{L\hom_{t-2}} = \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_{t-1}$$

$$\vdots$$

$$W_1 = \ \overline{L\hom_1} = \ \overline{L\hom_0} + \ \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_1 \quad (\textit{this is the value for year } 1962)$$

$$\vdots$$

$$W_{44} = \ \overline{L\hom_{44}} = \ \overline{L\hom_0} + \ \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_{44} \quad (\textit{this is the value for year } 2005)$$

Adding these equations I obtain W_1 (the value for year 1962), and W44 (the value for year 2005), on the right hand side μ is added "t" times, and the fraction following μ is a constant multiplied by the sum of error terms. I obtain

$$\overline{L\hom_t} = \overline{L\hom_0} + \mu.t + \frac{\theta(1)}{\phi(1)}\sum_{i=1}^{t}\varepsilon_i \qquad (11)$$

This is, Newbold's (1990, 457, Eq.(6), which is a differential equations that solves after replacing the initial value for $\overline{L\hom_0}$, which is the logarithm of per capita murder in year 1940.

Cárdenas (1991), suggests that Eq.(11), should be changed when the ARIMA model includes autoregressive components. Since the ARIMA developed for Ohio (Table 2), includes autoregressive, and moving average components, I formally show this now.

$$L\hom_t - L\hom_{t-1} = \mu + \sum_{i=1}^{p}\phi_i W_{t-i} + \sum_{j=1}^{q}\theta_j\varepsilon_{t-j} + \varepsilon_t \qquad (12)$$

$$\Delta L\hom_t = W_t = Lt\hom_t - Lt\hom_{t-1}$$

$$L\hom_t - L\hom_{t-1} = \mu + \sum_{i=1}^{p}\phi_i\Delta L\hom_{t-i} + \sum_{j=1}^{q}\theta_j\varepsilon_{t-j} + \varepsilon_t$$

Bringing the moving average components to the LHS, I get

$$L\text{hom}_t - L\text{hom}_{t-1} - \left(\sum_{i=1}^{p} \phi_i \Delta L\text{hom}_{t-1} \right) = \mu + \sum_{i=1}^{q} \theta_j \varepsilon_{t-j} + \varepsilon_t \qquad (13)$$

Expanding summation terms

$$(1 - \phi_1 L^1 - \phi_2 L^2 - . . - \phi_p L^p)(L\text{hom}_t - L\text{hom}_{t-1}) = \mu + (1 + \theta_1 L^1 + . . + \theta_q L^q)\varepsilon_t \quad (14)$$

Rearranging Eq. (14) and including the ARIMA parameters from Table 2, I get.

$$L\text{hom}_t - L\text{hom}_{t-1} = \frac{0.064}{1-0.36-0.13-0.35+0.21+0.63} + \left(\frac{1+0.55+3.19+3.44+1.53}{1-0.36-0.13-0.35+0.21+0.63} \right) \varepsilon_t \quad (15)$$

Now, after recursively replacing, t with (t-1), and (t-1) with (t-2), etc, and after adding together "t" times, I have

$$L\text{hom}_t - L\text{hom}_0 = \frac{0.064t}{1-0.36-0.13-0.35+0.21+0.63} + \left(\frac{1+0.55+3.19+3.44+1.53}{1-0.36-0.13-0.35+0.21+0.63} \right) \sum_{i=1}^{t} \varepsilon_i \quad (16)$$

And rearranging,

$$L\text{hom}_t = L\text{hom}_0 + \frac{0.064t}{1-0.36-0.13-0.35+0.21+0.63} + \left(\frac{1+0.55+3.19+3.44+1.53}{1-0.36-0.13-0.35+0.21+0.63} \right) \sum_{i=1}^{t} \varepsilon_i \quad (17)$$

In the steady state, when L=1, Eq. (17) yields the permanent component of the per capita murder for Ohio, the last step requires taking the exponential to the LHS of Eq. 17, getting the level for the permanent component. The cyclical component is finally obtained by the difference of the level of the observed per capita murder minus the level of the permanent component. Both permanent and cyclical estimated components are shown in Fig.4.

Appendix B : data table

	Original Data		BEVERIDGE – NELSON Terrorist murder and attacks index	
year	Murder	Murder per capita	Cyclical – component	Permanent component
1933		7.80		
1934		7.50		
1935		7.00		
1936		6.50		
1937		5.60		
1938		4.60		
1939		5.00		
1940		4.80		
1941		4.81		
1942		5.11		
1943		4.79		
1944		4.33		
1945		5.43		
1946		5.91		
1947		5.69		
1948		5.35		
1949		5.37		
1950		4.08		
1951		4.34		
1952		4.32		
1953		4.20		
1954		3.80		
1955		3.70		
1956		5.40		
1957		4.90		
1958		3.10		
1959		3.20		
1960	311	3.20		
1961	306	3.10		
1962	321	3.18	1.0157	2.1635
1963	306	3.01	0.9130	2.0950
1964	350	3.47	1.0175	2.4479
1965	366	3.57	1.5857	1.9868
1966	462	4.48	2.6451	1.8382
1967	545	5.21	2.8123	2.3991
1968	562	5.31	2.7854	2.5210
1969	685	6.38	3.3745	3.0035
1970	699	6.56	4.7280	1.8342
1971	811	7.52	5.8446	1.6800
1972	811	7.52	6.5215	0.9996
1973	783	7.30	6.3391	0.9575
1974	952	8.87	6.7499	2.1167
1975	876	8.14	6.4652	1.6768
1976	792	7.41	6.1945	1.2143
1977	833	7.78	6.3780	1.4063
1978	741	6.89	6.0566	0.8371
1979	865	8.06	6.9801	1.0807
1980	871	8.09	6.8111	1.2786

1981	799	7.41	6.0943	1.3203
1982	676	6.26	4.1028	2.1617
1983	600	5.58	3.6681	1.9154
1984	551	5.12	3.1002	2.0244
1985	554	5.16	2.9056	2.2507
1986	595	5.53	4.2847	1.2492
1987	630	5.84	4.7482	1.0938
1988	585	5.38	4.4068	0.9740
1989	652	5.98	4.9501	1.0277
1990	663	6.11	4.6723	1.4399
1991	783	7.16	5.1216	2.0363
1992	724	6.57	3.4204	3.1518
1993	667	6.01	3.4439	2.5700
1994	662	5.96	3.3783	2.5846
1995	600	5.38	2.5880	2.7927
1996	538	4.82	2.0241	2.7911
1997	523	4.68	1.1118	3.5637
1998	443	3.95	1.7441	2.2081
1999	397	3.53	0.9705	2.5563
2000	418	3.68	0.2622	3.4196
2001	452	4.00	0.6282	3.3718
2002	526	4.60	0.8465	3.7535
2003	526	4.60	0.6226	3.9774
2004	517	4.40	0.8514	3.5486
2005	585	5.10	1.0844	4.0156

References

Bernard, Bruce. 2002. CENTURY, one hundred years of human progress, regression, suffering and hope. Phaidom Press Inc, New York, NY.

Beveridge, S., Nelson, C.R., 1981. A new approach to decomposition of economic time series into permanent and transitory components with particular attention to measurement of the "business cycle". Journal of Monetary Economics 7, 151-174.

Blumstein, A., Wallman, J., 2000. The Crime drop in America. Cambridge University Press.

Clark, Ramsey., 1970. Crime in America. Simon and Schuster publishers, New York.
Campbell, J.Y., P, Perron., 1991. "Pitfalls and opportunities: What Macroeconomists Should Know about Unit Roots," in O.J. Blanchard and S. Fisher (eds.), *NBER Macroeconomics Annual*, The MIT Press, 141-201.

Cárdenas, M., 1991. Coffee Exports, Endogenous State Policy and the Business Cycle. PhD dissertation. Economics. University of California, Berkeley, CA.

Cuddington, J., Winters, L.A., 1987. The Beveridge-Nelson decomposition of economic time series. Journal of Monetary Economics 19, 125-127.

Dickey, D.A., Fuller, W.A., 1981. Likelihood ratio statistics for autoregressive time series with a unit root. Econometrica 49, 1057-1972.

Dosal, Paul., 2002. THE CARIBBEAN WAR: The United States in the Caribbean, 1898-1998. Cercles 5: pp. 39-55, online at http://www.cercles.com/n5/dosal.pdf.

Durham, Jennifer L., 1996. Crime in America: A Reference Handbook. ABC – CLIO, Inc, Santa Barbara California.

Eck, John and Maguire Edward., 2000. Have changes in policing reduced violent crime? assessment of the evidence. In *The Crime Drop in America* by Alfred Blumstein and Joel Wallman Editors. Cambridge University Press.

Enders, Walter and Sandler, Todd., 2006. The Political Economy of Terrorism. Cambridge University Press. New York.

Gómez-Sorzano, Gustavo A., 2005. "A model of cyclical terrorist murder in Colombia, 1950-2004. Forecasts 2005-2019". Unpublished paper, presented at the 14th World Congress of Criminology, paper nominated to the Stockholm Prize in Criminology, online at http://mpra.ub.uni-muenchen.de/134/01/MPRA_paper_134.pdf

Gómez-Sorzano, Gustavo A., 2006. Decomposing Violence: Crime Cycles in the Twentieth Century in the United States. Journal of Applied Econometrics and International Development Vol.7-1, pp.

________________________, 2006A. " Scenarios for sustainable peace in Colombia by year 2019." Unpublished paper, University of Pennsylvania, submitted to the Colombian Presidency, High Commissioner for Peace, Bogotá, Colombia, April. Online at http://mpra.ub.uni-muenchen.de/135/01/MPRA_paper_135.pdf

________________________, 2006B. "The econometrics of violence, terrorism and scenarios for peace in Colombia from 1950 to 2019. Unpublished book, University of Pennsylvania, Philadelphia, October. Online at http://mpra.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf

________________________, 2006C. "Decomposing violence: terrorist murder in the twentieth century in the United States". Unpublished paper, Stockholm Criminology Symposium 2006, Stockholm, Online at http://mpra.ub.uni-muenchen.de/1145/01/MPRA_paper_1145.pdf

________________________, 2006D. "Using the Beveridge and Nelson decomposition of economic time series for pointing out the occurrence of terrorist attacks". Unpublished paper, Stockholm Criminology Symposium 2007, Stockholm, Online at http://mpra.ub.uni-muenchen.de/3388/01/MPRA_paper_3388.pdf

________________________,2006E. "Decomposing violence: terrorist murder and attacks in New York State from 1933 to 2005". Unpublished paper, Stockholm Criminology Symposium 2007, Stockholm University, online at http://mpra.ub.uni-muenchen.de/3776/01/MPRA_paper_3776.pdf

________________________,2007A. "Terrorist murder, cycles of violence and terrorist attacks in New York City during the last two centuries". Unpublished paper, Stockholm Criminology Symposium 2008, Stockholm University, online at http://mpra.ub.uni-muenchen.de/4200/01/MPRA_paper_4200.pdf

________________________,2007B. "Cycles of violence and terrorist attacks index for the State of Massachusetts." Unpublished paper, Stockholm Criminology Symposium 2008, Stockholm University, online at http://mpra.ub.uni-muenchen.de/4342/01/MPRA_paper_4342.pdf

________________________,2007C. "Cycles of violence and terrorist attacks index for the State of Arizona." Unpublished paper, Stockholm Criminology Symposium 2008, Stockholm University, online at http://mpra.ub.uni-muenchen.de/4360/01/MPRA_paper_4360.pdf.

________________________,2007D. "Cycles of violence and terrorist attacks index for the State of California." Unpublished paper, Stockholm Criminology Symposium 2008, Stockholm University, online at http://mpra.ub.uni-muenchen.de/4547/01/MPRA_paper_4547.pdf.

________________________,2007E. "Cycles of violence and terrorist attacks index for the State of Washington." Unpublished paper, Stockholm Criminology Symposium 2008, Stockholm University, online at http://mpra.ub.uni-muenchen.de/4604/01/MPRA_paper_4604.pdf

Henretta, et al., James, 2006. America: A concise history, 3rd ed., vol.1 (Bedford-St. Martin's, 2006)

Hewitt, Christopher, 2005. "Political Violence and Terrorism in Modern America, a Chronology." Praeger Security International, Connecticut.

Kegley W. Charles Jr., Raymond, Gregory A., 2007. After Iraq: the imperiled American Imperium. Oxford University Press. New York

Lane, Roger, 1999. Violent death in the city, suicide, accident and murder in nineteeth-century Philadelphia. Ohio State University Press.

Levitt, Steven. D., 1996. "The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation." *Quarterly Journal of Economics* 111:319-51.

Menjívar, Cecilia and Néstor Rodríguez., 2005. When States Kill, Latin America, the U.S., and Technologies of Terror. University of Texas Press, Austin.

Miller, S.M., 1988. The Beveridge-Nelson decomposition of economic time series: another economic computational method. Journal of Monetary Economics 21, 141-142.

Monkkonen, Eric H., 2001. Murder in New York City. University of California Press. Berkeley and Los Angeles, California.

Newbold, P.,1990. Precise and efficient computation of the Beveridge-Nelson decomposition of economic time series. Journal of Monetary Economics 26, 453-457.

Marvell, Thomas B., and Carlisle E. Moody, Jr., 1994. "Prison Population Growth and Crime Reduction." *Journal of Quantitative Criminology* 10:109-40

Spealman, William., 1994. *Criminal incapacitation*. New York: Plenum.

________________., 2000. The limited importance of prison expansion. In *The Crime Drop in America* by Alfred Blumstein and Joel Wallman Editors. Cambridge University Press.

White, Jonathan R., 2003. Terrorism: 2002 update, 4th edition. (Belmont, CA: Wadsworth/Thomson Learning).