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

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Abstract: I apply the Beveridge-Nelson business cycle decomposition method to the time series of per capita murder of Michigan State (1933-2005). Separating out "permanent" from "cyclical" murder, I hypothesize that the cyclical part does not coincide with documented waves of organized crime, internal tensions, crime legislation, social, and political unrest, and with the periodic terrorist attacks to the U.S. The estimated cyclical component of murder shows that terrorist attacks against the U.S. have not affected Michigan, presenting this State, along with Arkansas as immune to the suffering of the nation, and to the occurrence of attacks. The State appears as having a growing index of permanent murder. This paper belongs to the series of papers helping the U.S, and Homeland Security identify the closeness of terrorist attacks, and constructs the attacks index for Michigan. Other indices constructed include the Index for the U.S., New York State, New York City, Arizona, Massachusetts, California, Washington, Ohio, Philadelphia City, Arkansas, Missouri, Florida, and Oklahoma. 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; terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries, and terrorist murder, cycles of violence, and attacks index for the City of Philadelphia during the last two centuries.

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

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Cycles of Violence, and Attacks Index for the State of Michigan

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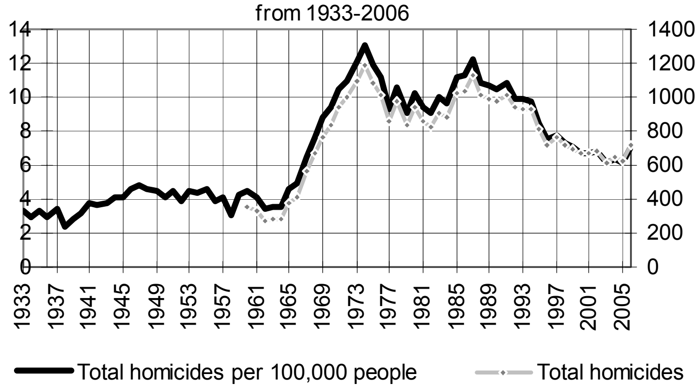
1. Introduction.

After decomposing violence, and creating the cyclical terrorist murder and attacks index for the United States (Gómez-Sorzano 2006), *terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries* (Gómez-Sorzano 2007A), and *terrorist murder, cycles of violence, and attacks index for the City of Philadelphia during the last two centuries* (Gómez-Sorzano 2007H) this paper continues that methodology research applied at the State level. The current exercise for Michigan State is the eleventh one at decomposing violence at the state level on the purpose of constructing murder, and attacks indices preventing the closeness of attacks or tragic events.

According to the Federal Bureau of Investigation, Uniform Crime Reporting System, total homicides in Michigan increased from an average of 431 per year in the 1960s to 981 in the 1970s, 959 in the 1980s, and 848 in the 1990s (Fig. 1), for year 2006 the State reported 713 homicides.

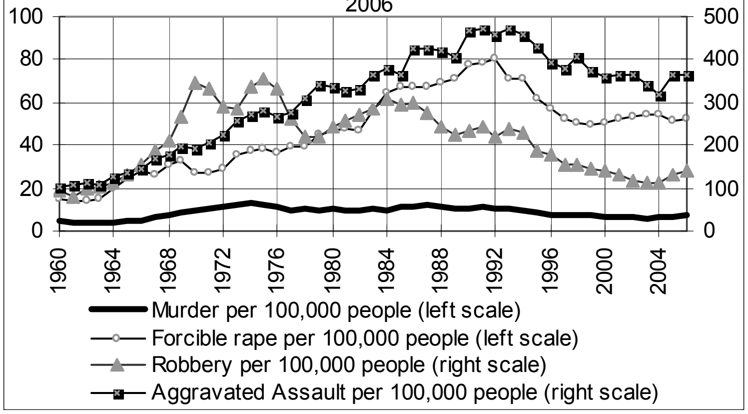
When adjusted for population growth, i.e., homicides per 100,000 people in the population, peaks are found in 1947, 1960, 1974, 1987, and 1992, with values of 4.85 murders per capita, and 4.51, 13.04, 12.22, 9.94, respectively for those years, and 7.06 for 2006.

Figure 1. Total homicides in Michigan State from 1933-2006



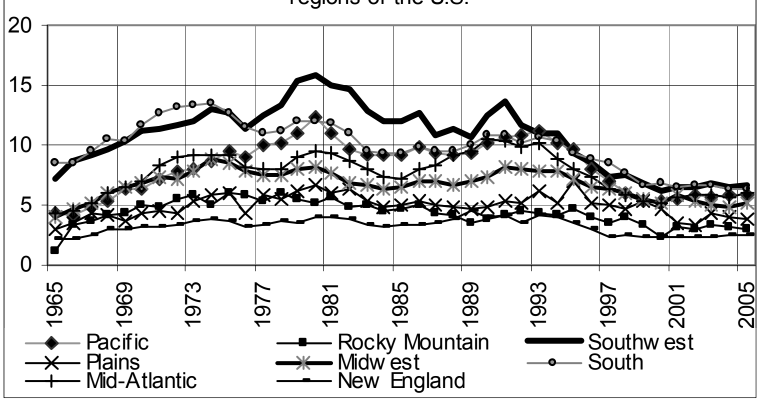
Out of the state's four categories of crimes, measuring violent crime (murder, forcible rape, robbery, and aggravated assault) murder is the one that varies the least, showing a diminishing tendency from 2004 to 2005, but jumping in 2006 (Fig. 2).

Figure 2. Categories of violent crime in Michigan State 1960-2006



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 Michigan belongs appears as the fifth highest rate across the nation with 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 Michigan 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(LMichi) – per capita murder series	26	0.45	0.014	-0.6418	No
Michigan State , 1933-2005		2.808	1.9766	-2.3400	

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)

An additional test for unit roots uses equation (2) with the series ran in levels its results are reported on table 2A.

$$L\,\mathrm{hom}_t = \alpha + \theta.\,t + \phi\, L\,\mathrm{hom}_{t-i} + \sum_{i=1}^{k} \gamma_i\, L\,\mathrm{hom}_{t-i} + \varepsilon_t \qquad (2)$$

Table 2A Dickey & Fuller test for Unit Roots

	K	Alpha	Theta	Phi	Stationary
(Lmichi) – per capita murder series	27	0.45	0.014	0.8981	No
Michigan State , 1933-2005		2.808	1.9766	4.3900	

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 rejecting the null for a unit root (accepting the time series is non stationary), I technically can perform the BN decomposition.

The selection of the right ARIMA model for Michigan was computationally intense, and I was able to find three models. The procedure begins by fitting the logarithm of the per capita murder series to an ARIMA model as shown on equation (2):

$$\Delta Lt\hom_t = \mu + \sum_{i=1}^{k} \gamma_i \Delta Lt\hom_{t-i} + \sum_{i=1}^{h} \psi_i \varepsilon_{t-i} + \varepsilon_t \qquad (2)$$

Where k, and h are respectively the autoregressive and moving average components. For Michigan, and using RATS 4, I estimated a first ARIMA model (22,1,16) – model 1, whose results are reported on table 3, and its transitory and permanent signals displayed on figure 4.

Table 3. First ARIMA model for murder for Michigan State

Annual data from 1933 to 2005

Variables	Coeff	T-stats	Std Error	Signif
Constant	-0.0257	-2.1679	0.0119	0.0360
AR(1)	-0.5140	-3.5325	0.1455	0.0010
AR(3)	-0.1414	-4.9983	0.0283	0.0000
AR(6)	1.3919	18.3073	0.0760	0.0000
AR(22)	-0.6995	-4.8833	0.1432	0.0000
MA(4)	-0.9019	-1.4118	0.6388	0.1655
MA(6)	-3.7944	-3.9459	0.9616	0.0003
MA(10)	-1.3530	-1.65	0.8200	0.1065
MA(16)	1.7285	2.0424	0.8463	0.0476

Centered R^2 = 0.9737

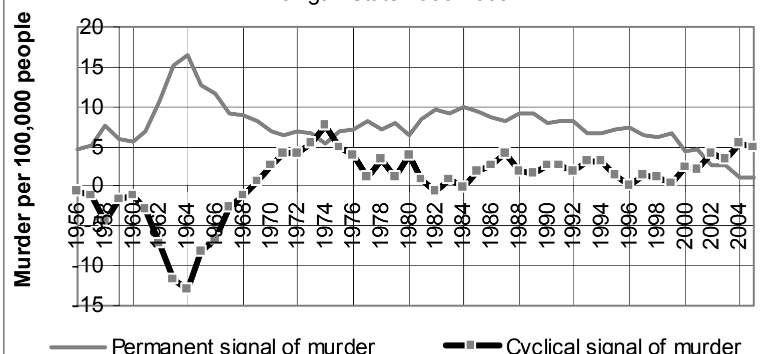
DW= 2.03

Significance level of Q = 0.054

Usable observations = 50

Model 1, does not reproduce to perfection major attacks to the country, its cyclical signal does not jump for the World Trade Center bombing of 1993, and 9/11 2001 (Fig. 4).

Figure 4. Cyclical and permanent signals from Model 1 for Michigan State 1956-2005



ARIMA model selected for Michigan State.

Table 3A, displays the ARIMA model finally selected as a (7,1,18) model.

Table 3A. ARIMA model for murder for Michigan State

Annual data from 1933 to 2005

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0163	3.1323	0.0052	0.0027
AR(1)	-0.4443	-4.675	0.0950	0.0000
AR(2)	0.2904	2.0282	0.1431	0.0473
AR(7)	-0.1744	-3.2873	0.0531	0.0017
MA(1)	0.9788	10.2084	0.0959	0.0000
MA(2)	-0.4379	-2.6607	0.1646	0.0102
MA(11)	-1.0736	-6.8779	0.1561	0.0000
MA(16)	0.4692	3.084	0.1521	0.0031
MA(18)	-0.6674	-4.396	0.1518	0.0000

Centered R^2 = 0.9680

DW= 1.98

Significance level of Q = 0.01160

Usable observations = 65

The 9 model parameters from table 3A or model 2 are replaced in the equation for the permanent component of murder shown in (3)[2]:

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

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 ($L\hom_t^{PC}$)[3], and is shown on figure 5 along with the permanent component of murder for the State. The attacks index does not match the qualitative description of known waves of organized crime, internal tensions, crime legislation, social, and political unrest overseas, and presents the cycles of violence in the State as not affected by major attacks across the union, a similar behavior for a State attacks index was previously observed for the Case of Arkansas[4]. 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), Dosal (2002), Hewitt (2005), Monkkonen (2001), Wikepedia, the Military Museum, and Henrreta et al. (2006).

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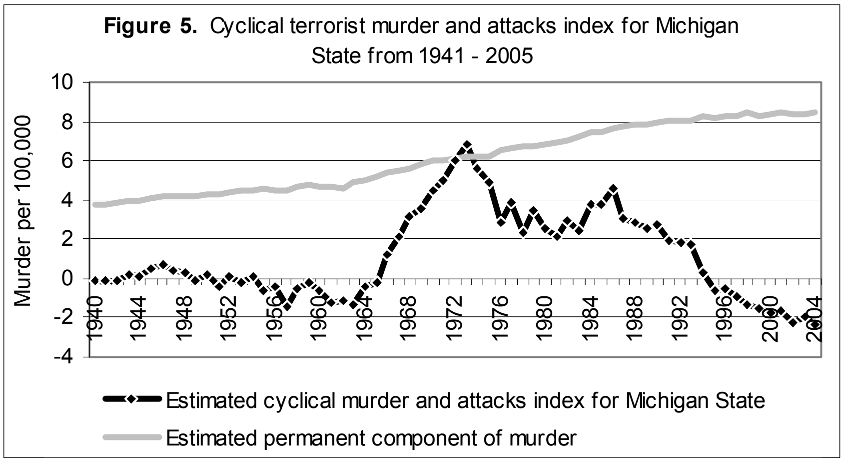
[2] The extraction of permanent and cyclical components from the original series is theoretically shown in BN (1981), Cuddington and Winters (1987), Miller (1998), Newbold (1990), and Cárdenas (1991). I show the mathematical details for the U.S.' case in appendix A. Eq.3 above, turns out to be Eq.17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

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

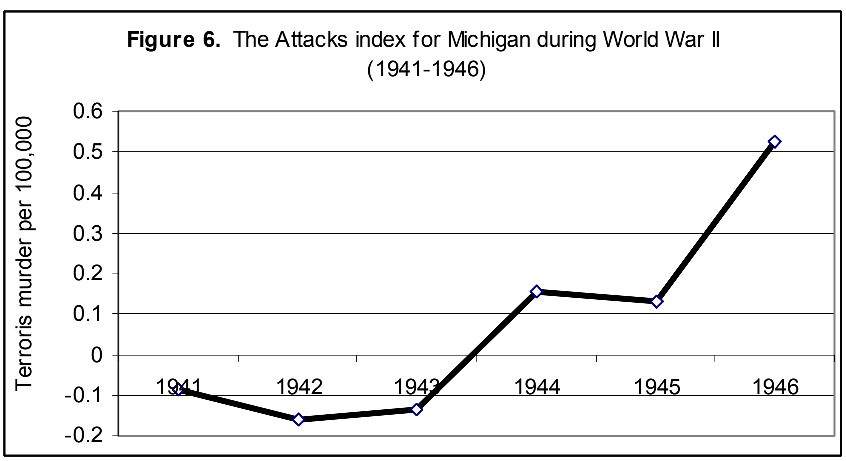
[4] http://mpra.ub.uni-muenchen.de/4606/01/MPRA_paper_4606.pdf.



3. Interpretation of results.

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

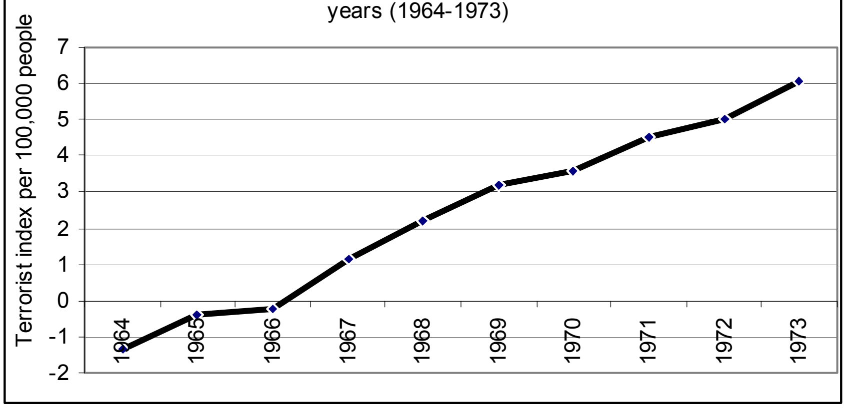
Figure 6, presents the attacks index during the World War II, the index begins with -0.08, ending up in 1946 with 0.52; Japan surrendered to the U.S. on 2 September 1945, the index still jumped from 1945 to 1946, from 0.13 to 0.52. The graph additionally shows the behavior during the U.S. Good Neighbor Policy Period (1933-1945).



The assassination of President John F. Kennedy in 1963 affected this index which moved from 1962 to 1963 from -1.20 to -1.11 (8.1%); the entrance to the Vietnam

Conflict in 1964 fueled this index up from -1.35 to 6.03 by the end of this conflict in 1973 (Figure 7).

Figure 7. The attacks index for Michigan during the Vietnam Conflict years (1964-1973)



For the shut down in power in New York City, and Los Angeles riots, both occurring in 1965, this index jumped from -1.35 to -0.40 (237.5%). The assassination of Dr. Martin Luther King Jr., jumped the index from 1.17 in 1967 to 2.17 in 1968 (85.4%), Figure 7.

From 1975 to 2005, this index drops abruptly. This sub-period begins with an attacks indicator of 5.60 in 1975, ending up with -2.33 in 2005. A period characterized by the end of the war on drugs in Colombia 1985-1992. In 1992 the U.S. with cooperation of Colombian authorities Kill Pablo Escobar, this year additionally the U.S. experience military operations in Los Angeles, and as well the FBI successfully prosecutes New York's Gambino family crime boss John Gotti on 13 charges of murder, gambling, racketeering, and tax fraud. The attacks index for Michigan diminishes from 1991 to 1992 from 2.76 to 1.92.

This index did not moved up, in 1992 as a consequence of the first military operations in Los Angeles, neither it jumped for the World Trade Center bombing in 1993, the bombing of the Alfred P. Murrah Federal building occurred in 1995, or 9/11 2001; these facts suggest that Michigan has been immune to the suffering of the nation, and has broke up the cycle of violence.

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 Michigan State. The index appears abruptly descending from 1973 to 2005, indicating this State has been able to break the cycle of violence, presenting the State as safe and immune to recent terrorist attacks across the union. Immediate research should be done, particularly headed towards constructing a model for attacks, and for permanent murder for this State.

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

Acknowledgements

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

I denote the observations of a stationary series of the logarithm of per capita homicides for Michigan 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

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

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

$$\begin{aligned} \hat{W}_t(i) &= \mu + \lambda_i \varepsilon_t + \lambda_{i+1} \varepsilon_{t-1} + \ldots \qquad (4) \\ & \mu + \sum_{j=1}^{\infty} \lambda_j \ \varepsilon_{t+1-j} \ , \end{aligned}$$

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

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

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

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

And considering long forecasts, I approximately have

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

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 $L\text{hom}_t$ (intercept or first value of the series).

Denoting this level by $\overline{L\text{hom}_t}$, I have

$$\overline{L\text{hom}_t} = L\text{hom}_t + \left(\sum_{1}^{\infty} \lambda_i\right)\varepsilon_t + \left(\sum_{2}^{\infty} \lambda_i\right)\varepsilon_{t-1} + \,.\,.\,.\,.\,.\,.\,. \quad .(7)$$

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.

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

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

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

The next step requires replacing the parameters of the ARIMA model (Table 3A) and iterating Eq.(9) recursively, i.e., replace t by (t-1), and (t-1) by (t-2), etc, I get

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

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

:

$$W_1 = \overline{L\hom_1} = \overline{L\hom_0} + \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_1 \quad (\textit{this is the value for year } 1941)$$

:

$$W_{65} = \overline{L\hom_{59}} = \overline{L\hom_0} + \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_{65} \quad (\textit{this is the value for year } 2005)$$

Adding these equations I obtain W_1 (the value for year 1941), and W65 (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 difference equation that solves after replacing the initial value for $\overline{L\hom_0}$, which is the logarithm of per capita murder in year 1941.

Cárdenas (1991), suggests that Eq.(11), should be changed when the ARIMA model includes autoregressive components. Since the ARIMA developed for Michigan (Table 3A), 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

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

Expanding summation terms

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

Rearranging Eq. (14) and including the ARIMA parameters from Table 3A, I get.

$$L\hom_t - L\hom_{t-1} = \frac{0.01630}{1+0.44-0.29+0.17} + \left(+ \frac{1+0.97-0.43-1.07+0.46-0.66}{1+0.44-0.29+0.17} \right)\varepsilon_t \quad (15)$$

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

$$L\hom_t - L\hom_0 = \frac{0.016t}{1+0.44-0.29+0.17} + \left(\frac{1+0.97-0.43-1.07+0.46-0.66}{1+0.44-0.29+0.17} \right) \sum_{i=1}^{t} \varepsilon_i \quad (16)$$

And rearranging,

$$L\hom_t = L\hom_0 + \frac{0.016\ t}{1+0.44-0.29+0.17} + \left(\frac{1+0.97-0.43-1.07+0.46-0.66}{1+0.44-0.29+0.17} \right) \sum_{i=1}^{t} \varepsilon_i \quad (17)$$

In the steady state, when L=1, Eq. (17) yields the permanent component of the per capita murder for Michigan, 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 on figure 5.

Appendix B : data table

	Original Data		BEVERIDGE - NELSON Terrorist murder and attacks index	
year	Murder	Murder per capita	Cyclical - component	Permanent component
1933		3.30		
1934		2.90		
1935		3.30		
1936		2.90		
1937		3.40		
1938		2.30		
1939		2.80		
1940		3.20		
1941		3.73	-0.0850	3.8150
1942		3.62	-0.1581	3.7781
1943		3.76	-0.1359	3.8959
1944		4.08	0.1547	3.9253
1945		4.11	0.1317	3.9783
1946		4.63	0.5239	4.1061
1947		4.85	0.6867	4.1633
1948		4.63	0.4331	4.1969
1949		4.49	0.2993	4.1907
1950		4.11	-0.0928	4.2028
1951		4.47	0.1616	4.3084
1952		3.88	-0.4286	4.3086
1953		4.50	0.1120	4.3880
1954		4.30	-0.2241	4.5241
1955		4.60	0.1355	4.4645
1956		3.90	-0.6380	4.5380
1957		4.10	-0.3980	4.4980
1958		3.10	-1.4111	4.5111
1959		4.20	-0.4859	4.6859
1960	353	4.51	-0.2440	4.7562
1961	326	4.10	-0.5907	4.6893
1962	275	3.44	-1.2024	4.6437
1963	283	3.49	-1.1176	4.6046
1964	284	3.51	-1.3544	4.8615
1965	378	4.60	-0.4077	5.0074
1966	415	4.96	-0.2216	5.1774
1967	560	6.52	1.1724	5.3514
1968	669	7.65	2.1791	5.4753
1969	770	8.78	3.1869	5.5971
1970	831	9.36	3.5939	5.7694
1971	942	10.47	4.5028	5.9673
1972	999	11.00	5.0171	5.9826
1973	1096	12.12	6.0386	6.0799
1974	1186	13.04	6.8641	6.1717
1975	1086	11.86	5.6060	6.2538
1976	1014	11.14	4.8929	6.2451
1977	853	9.34	2.8402	6.5036
1978	972	10.58	3.9060	6.6719
1979	834	9.06	2.3682	6.6891
1980	940	10.19	3.4626	6.7237
1981	861	9.36	2.5452	6.8125

1982	827	9.08	2.1211	6.9578
1983	910	10.03	2.9973	7.0369
1984	879	9.69	2.4825	7.2035
1985	1018	11.20	3.7525	7.4491
1986	1032	11.28	3.8152	7.4697
1987	1124	12.22	4.5922	7.6252
1988	1009	10.85	3.0530	7.7964
1989	993	10.71	2.8375	7.8710
1990	971	10.45	2.5666	7.8796
1991	1009	10.77	2.7672	8.0035
1992	938	9.94	1.9205	8.0191
1993	933	9.84	1.7800	8.0639
1994	927	9.76	1.7103	8.0517
1995	808	8.46	0.2431	8.2185
1996	722	7.53	-0.6296	8.1551
1997	759	7.77	-0.5322	8.2977
1998	721	7.34	-0.9014	8.2458
1999	695	7.05	-1.3821	8.4281
2000	669	6.73	-1.5137	8.2451
2001	672	6.70	-1.7120	8.4120
2002	678	6.80	-1.6203	8.4203
2003	612	6.10	-2.2951	8.3951
2004	643	6.40	-1.9940	8.3940
2005	629	6.10	-2.3312	8.4312
2006	713	7.06		

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