Mass Incarceration and Quantum-Tempo Effects in African-American Fertility, 1980-2006 *

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Abstract

The growth of the criminal justice system over the last three decades has affected a host of important socioeconomic and demographic outcomes, particularly for young African-American men. Despite growing attention to labor market, educational, and political inequality associated with penal growth, research has yet to investigate how the expansion of the prison industrial complex impacts the timing and levels of fertility. Using a unique dataset created from multiple data sources, we propose to estimate quantum and tempo distortions associated with mass incarceration, within a counterfactual framework that controls for differential selection into prison. Our analysis draws attention to a vital demographic process that is perturbed by increasing incarceration rates over time.

Introduction

The United States has experienced tremendous growth in imprisonment over the last four decades, with the penal population more than quadrupling in size. Although current crime rates are on par with levels observed since the late 1960s, contemporary incarceration rates remain at historic highs.

[INSERT FIGURE 1 HERE]

Figure 1 displays crime and incarceration rates since the early 1970s. Property and violent crime vacillated periodically throughout the 1970s and 80s, with violence reaching its zenith (at almost 800 crimes per 100,000 residents) in the early 1990s. Property crime also began to decline around the same time, from a high of approximately 5600 incidents per 100,000. Yet, incarceration rates continued to rise, marking the decoupling between crime and punishment in America.

The United States incarcerates a higher fraction of its population than any other society in recorded history; we have more men and women incarcerated than the top 36 European nations combined, including Russia (Walmsey 2011). Just under 2.3 million American are behind bars, comprising approximately 1% of the adult population in the United States, and

another 4.9 million men and women are under the community supervision of the criminal justice system (Pew 2008; Harrison et al. 2008; West and Sabol 2008). Incarceration is disproportionately concentrated among young, undereducated black men. Research shows that one in nine black men was incarcerated on any given day in 2008,with over one-third of young, black, male high school dropouts housed behind bars (Pettit and Western 2004; Pettit et al. 2009). The lifetime cumulative risk of imprisonment hovers around 70% for this group of men (Pettit et al. 2009; Western and Wildeman 2009).

The massive increase in imprisonment now means that inmates housed in prisons and jails are often left out of the social accounting of national data collection agencies due to their institutionalization. Mass incarceration — rates of imprisonment significantly above historical and societal levels that lead to the systematic incapacitation of particular groups within a society (Garland 2001) — has influenced the representativeness of individuals living in households so profoundly that it undermines the establishment of facts, explanations of the factors thought to produce them, and policy that relies on them (Pettit 2012). The growing exclusion of particular socioeconomic groups may have significant implications for how we understand classic demographic processes.

Incarceration and Family Formation

Past work on marriage market asymmetries consistently finds that black marriage rates are lower than those of other races (Brien 1997; Koball 1998; Lichter et al. 1992). Assortative mating and marriage squeeze theories explain why black women are more disadvantaged in the marriage market. Assortative mating theory posits that people with similar human capital investments and values tend to marry, whereas marriage squeeze theory proposes that individuals are constrained by the age-specific population of available partners (Schoen 1983; Muhsam 1974; Akers 1967). Black women are particularly disadvantaged because African-American men disproportionately experience premature adult mortality and imprisonment.

Because one-third of low skill, black men will spend time in prison over the course of their adult lives (Pettit and Western 2004), assortative mating theory would suggest that such men would not make ideal partners because of lower employment prospects (Western 2006; Pager 2004) and other human capital imbalances. The effect of incapacitation due to imprisonment means that there are fewer available men per woman in the marriage market. Wilson and Neckerman (1986) reconcile assortative mating and marriage squeeze theories by creating a male marriageable pool index that indicates the ratio of men to women who are employed and of the same age-race groups in the non-institutionalized population. Their analysis implicates male joblessness, in combination with premature male mortality and incarceration, as salient causes for the decline in marriage, especially among black women.

Similarly, working within the marriage squeeze paradigm, Charles and Luoh (2005) use variation in mate preferences and local incarceration rates to examine the effect of incarceration on marriage. Because most marriages are racially endogamous, Charles and Luoh exploit local marriage market and incarceration trends by race, age, and geographic space under the assumption that marriage and incarceration rates vary considerably on these three demographic dimensions. They find that male incarceration lowers the likelihood that women will marry and that the gains to marriage shift away from women and toward men.

Additionally, a paucity of research exists on marriageability over the life-course for individuals who experience incarceration. Giordano et al.'s (2002) interview data distill, for example, that marriage (and remarriage) can occur across the lifecycle for ex-inmates who are open to change and make the necessary cognitive transformation", provided there is a hook for change. However, other quantitative work suggests that stigma associated with incarceration exerts a lasting effect on one's marriageability. After accounting for a number of socio-demographic characteristics, Western and Lopoo (2006) examine the effect of incarceration on marriage and find that men who have been incarcerated are less likely to marry than men who were never incarcerated, with Western et al. (2004) arriving at similar conclusions for the effect of incarceration on marriage and cohabitation. However, there is

no evidence that incarceration significantly lowers black marriage rates despite depressed labor market opportunities (Lopoo and Western 2005).

Incarceration and Fertility

The growing prevalence of incarceration in particular racial and educational groups raises important questions about the impact of mass imprisonment on fertility. Half of all inmates are parents who leave behind 2.6 million children (Pettit 2012; Pettit et al. 2009). Race and class disparities in imprisonment trickle down into the lifetime risk of having a parent incarcerated, with almost one-quarter of black children under the age of 14 having a father in prison or jail (Wildeman 2009).

Despite the increased likelihood of children having a parent behind bars, little is known if recent declines in period fertility, particularly for young women of color, may be attributable to the differential siphoning of men into the prison system. If period specific birth rates are influenced by the incarceration of men, there is reason to believe there may be large quantum and tempo distortions as a result of institutional interventions in the lives of disadvantaged men. In this paper, we propose to assess how much of the quantum-tempo distortions in African-American fertility is due to increases in formal social control of young, black men.

Data and Measures

We combine data from periodic surveys of inmates in state, federal, and local jails to generate the race, educational, sex, and age distributions of the population, weighted by annual correctional counts provided by the BJS to produce cross-classified counts of the inmate population by year. Linear interpolation is used between survey years to generate a complete data panel. This procedure follows established methods for constructing a prison population panel dataset for a variety of demographic outcomes (Pettit and Western 2004; Pettit, Sykes, and Western 2009; Wildeman 2009; Pettit 2012). We merge the cross-classified inmate

panel with the March Current Population Survey (CPS) since 1980 to create annual civilian incarceration rates by race, class, age, and sex.

Next, we construct annual birth totals using the Natality Detail Files from 1980-2006. These data are collected by the U.S. Department of Health and Human Services and the CDC. We code each birth by father's age and race for that period. For surveys that did not ask about father's educational attainment (e.g., 2006), we used maternal education as a proxy for father's education. In years where father's education or race was missing, we impute his highest grade of schooling and racial category using all available information on the mother. Fertility rates by race, age, and class are created using within group population counts of women derived from the CPS. The fertility panel is then merged with the incarceration panel to construct one dataset to analyze quantum-tempo distortions attributable to mass incarceration.

Methods

The total fertility rate (TFR) — the number of children a women is expected to have assuming the age-specific birth rates persist to and through her childbearing years — is the most widely used measure in fertility research. Period changes and cross-national statistics rely on this fertility metric to assess population replacement, forecast future workforce size, and to measure various stages of the demographic transition for a nation. Yet the TFR is an imperfect proxy for cohort completed fertility because it may conceal changes in timing and parity-specific levels of births across different birth-cohorts of women. Bongaarts and Feeney (1998) provide a method for estimating quantum and tempo effects by assuming that age, parity, period, and duration since last birth matter for measuring these changes but that the underlying shape of the fertility distribution for a cohort is invariant during that period. The fertility schedule, as a result, can move to the right or left (i.e., faster or slower due to tempo effects) or up and down (i.e., higher or lower due to quantum effects).

We apply Bongaarts and Feeney's (BF) approach to measuring quantum and tempo effects in fertility. Although refinements, critiques, and applications abound in the literature on quantum and tempo effects (Kim and Schoen 2000; Imhoff and Kellman 2000; Bongaarts and Feeney 2000; Pilipov and Kohler 2001; Bongaarts 2002; Kohler and Ortega 2002; Sobotka 2003; Schoen 2004; Bongaarts and Feeney 2005; Lutz and Skirbekk 2005; Wachter 2005), we focus on the original formulations to measure changes in the TFR for specific demographic groups. While there is some evidence that the BF quantum-tempo method may perform erratically when there are cycles in period timing (Schoen 2004), we elect their original formulation because those cycles may be the result of institutional intervention for men experiencing criminal justice contact, thereby reducing the pool of available men for mating. The removal of these men, within specific demographic groups, has some effect on aggregate, period measures like the TFR. To estimate variance effects in these methods, we will follow guidelines outlined in Kohler and Philipov (2001).

The age-specific fertility rates $f(a,t)$ are a function of continuous age (a) and time (t), allowing for the derivation of period TFR (equation 1) and mean age at childbearing (equation 2).

$$TFR(t) = \int f(a,t)da \tag{1}$$

and

$$A(t) = \frac{\int af(a,t)da}{TFR(t)} \tag{2}$$

Because the TFR for period (t) can be expressed as the sum of the TFR at each birth order (i), Bongaarts and Feeney show that

$$TFR_i^{'}(t) = \frac{TFR(t)}{(1-r_i)} \tag{3}$$

where $TFR_i^{'}(t)$ represents the parity-specific tempo adjusted TFR after accounting for

changes in the mean age of childbearing (r) during the beginning and end of the year for that birth order (i).[1] Summing over all birth orders provides the adjusted $TFR^{'}(t)$ such that

$$TFR^{'}(t) = \sum TFR_{i}^{'}(t) \tag{4}$$

For the purposes of this paper, we are interested in understanding how the rapid growth in mass imprisonment has affected African-American fertility. We propose to model changes in the tempo effects between periods t and $t+n$ (i.e., $\Delta TFR^{'}$), where n is the width of the period, as a function of changes in the incarceration rates. Let

$$\Delta TFR^{'} = \beta_0 + \beta_1 \Delta I + \beta_k \mathbf{X} \tag{5}$$

where ΔI is the within race-education group difference in incarceration rates, between periods t and $t+n$, after accounting for a vector of k period-specific covariates ($\mathbf{X}$) in the population taken from the March CPS data.

While Equation 5 will give is the level of associations and variance explained in the quantum-tempo effects, this model cannot assess whether these period distortions are caused by mass incarceration. To resolve this issue and address these selection effects, we will use case-control methods to estimate the effect of incarceration on quantum-tempo distortions. Because incarceration is not randomly distributed across the population, propensity-score matching techniques ensure comparisons between groups who are similar on all characteristics except their incarceration history. Propensity-score matching simulates experimental data using observational data by using observed covariates of a treatment variable in order to estimate a groups' propensity to be incarcerated. The propensity score is the conditional probability of being incarcerated and can be expressed as

[1] $r_i(t) = (a_i(t+1) - a_i(t-1))/2$

$$P(\Delta TFR_j^{'}) = Pr(T_j = 1|X) \tag{6}$$

where $T_j = 1$ if the j^{th} group has been incarcerated and X_j is a vector of socio-demographic, social background, geographic, and labor market covariates that predict quantum-tempo distortions and are potential confounders in the association incarceration and fertility timing. The method balances background characteristics of treated and untreated respondents to ensure that any aggregate fertility distortions are not due to significant differences in observed characteristics (Rosenbaum and Rubin 1983; 1984).

Bibliography

Akers, Donald. 1967. On Measuring the Marriage Squeeze. Demography 4:907-924.

Alexander, Michelle. 2010. The New Jim Crow: Mass Incarceration in the Age of Colorblindness. NY: The New Press.

Bongaarts, John. 2002. THe End of the Fertility Transition in the Developed World. Population and Development Review 28(3): 419-43.

Bongaarts, John and Friffith Feeney. 1998. On the Quantum and Tempo of Fertility. Population and Development Review 24(2): 271-91.

Bongaarts, John and Friffith Feeney. 2000. On the Quantum and Tempo of Fertility: Reply. Population and Development Review 26(3): 271-91.

Bongaarts, John and Friffith Feeney. 2005. The Quantum and Tempo of Life-Cycle Events. Population Council. Working Paper No. 207

Brien, Michael. 1997. Racial Differences in Marriage and the Role of Marriage Markets. Journal of Human Resources 32:741-778.

Bulcroft, R.A. and K.A. Bulcroft. 1993. Race Differences in Attitudinal and Motivational Factors in the Decision to Marry. Journal of Marriage and the Family 55:338-355.

Charles, Kerwin and Ming Luoh. 2005. Male Incarceration, the Marriage Market, and Female Outcomes. Unpublished Manuscript pp. 1-53.

Edin, Katheryn and Maria Kefelas. 2005. Promises I Can Keep: Why Poor Women Put Motherhood Before Marriage. CA: University of California Press.

Ewert, Stephanie, Bryan Sykes, and Becky Pettit. Forthcoming. The Degree of Disadvantage: Incarceration and Inequality in Education. The Annals of the American Academy of Political and Social Science.

Garland, David. 2001. The Meaning of Mass Imprisonment. In Mass Imprisonment: Social Causes and Consequences, edited by D. Garland. London: Sage Publications.

Giordano, Peggy, Stephen Cernkovich, and Jennifer Rudolph. 2002. Gender, Crime, and Desistance: Toward a Theory of Cognitive Transformation. American Journal of Sociology 107:990-1064.

Glaze, Lauren. 2010. Correctional Population in the United States, 2010. Washington, D.C.: Bureau of Justice Statistics. http://bjs.ojp.usdoj.gov/index.cfm?ty=pbdetail&iid=2237

Guerino,P., Piege Harrison, and William Sabol. 2011. Prisoners in 2010 (Revised). Wash-

ington, D.C.: Bureau of Justice Statistics. http://bjs.ojp.usdoj.gov/index.cfm?ty=pbdetail&iid=2230

Harknett, Kristen and Sarah McLanahan. 2004. Racial and Ethnic Differences in Marriage After the Birth of a Child. American Sociological Review 69:790-811.

Imhoff, Evert van and Nico Keilman. 2000. On the Quantum and Tempo of Fertility: Comment. Population and Development Review 64(3): 549-53.

Kim, Young and Robert Schoen. 2000. On the Quantum and Tempo of Fertility: Limits to the Bongaarts-Feeney Adjustment. Population and Development Review 26(3): 554-59.

King, Ryan, Michael Massoglia, and Ross Macmillian. 2007. The Context of Marriage and Crime: Gender, the Propensity to Marry, and Offending in Early Adulthood. Criminology 45:33-65.

Kohler, Hans-Peter and Dimiter Philipov. 2001. Variance effects in the Bongaarts-Feeney formula. Demography 38(1): 1-16.

Kohler, Hans-Peter and J. Ortega 2002. Tempo-Adjusted Period Parity Progression Measures, Fertility Postponement, and Completed Cohort Fertility. Demographic Research 6: 92-144.

Knight, Brian, S.G. Osborn, and Donald West. 1977. Early Marriage and Criminal Tendency in Males. British Journal of Criminology 17.

Koball, Heather. 1998. Have African-American Men Become Less Committed to Marriage? Explaining the Twentieth Century Racial Cross-Over in Men's Marriage Timing. Demography 35:251-258.

Lichter, Daniel, Diane McLaughlin, George Kephart, and David Landry. 1992. Race and the Retreat from Marriage: A Shortage of Marriageable Men' American Sociological Review 57:781-799.

Lopoo, Leonard and Bruce Western. 2005. Incarceration and the Formation and Stability of Marital Unions. Journal of Marriage and the Family 67:721-734.

Lutz, Wolfgang and Vegard Skirbekk. 2005. Policies Addressing the Tempo Effect in Low-Fertility Countries. Population and Development Review 31(4): 699-720.

Manning, Wendy and Pamela Smock. 1995. Why Marry? Race and the Transition to Marriage Among Cohabitors. Demography 32:509-520.

Musham, H.V. 1974. The Marriage Squeeze. Demography 11:291-299.

Osborn, S.G. and Donald West. 1979. Marriage and Delinquency: A Postscript. British Journal of Criminology 18.

Pager, Devah. 2003. The Mark of a Criminal Record. American Journal of Sociology 108:937-975.

Pager, Devah and Lincoln Quillian. 2005. Walking the Talk: What Employers Do Versus What They Say. American Sociological Review 70:355-380.

Pettit, Becky. 2012. Invisible Men: Mass Incarceration and the Myth of Black Progress. NY: Russell Sage Foundation.

Pettit, Becky and Bruce Western. 2004. Mass Imprisonment and the Life Course: Race and Class Inequality in U.S. Incarceration. American Sociological Review 69:151-169.

Pettit, Becky, Bryan Sykes, and Bruce Western. 2009. Technical Report on Revised Population Estimates and NLSY 79 Analysis Tables for the Pew Public Safety and Mobility Project. Cambridge, MA: Harvard University.

Philipov, Dimiter and Hans-Peter Kohler. 2001. Tempo Effects in the Fertility Decline in Eastern Europe: Evidence from Bulgaria, the Czech Republic, Hungary, Poland, and Russia. European Journal of Population 17(1): 37-60.

Rosenbaum, Paul and Donald Rubin. 1983. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." Biometrika 70:41-55.

Rosenbaum, Paul and Donald Rubin. 1984. "Reducing Bias in Observational Studies Using Sub classification on the Propensity Score." Journal of the American Statistical Association 79:516-524.

Rosenfeld, Jake, Jennifer Liard, Bryan Sykes, and Becky Pettit. 2011. Mass Imprisonment and Racial Inequality in Voter Turnout, 1980-2012. Paper Presentation at the Annual Population Association of America Meeting.

Schoen, Robert. 1983. Measuring the Tightness of A Marriage Squeeze. Demography 20:61-78.

Schoen, Robert. 2004. Timing Effects and the Interpretation of Period Fertility. Demography 41(4): 801-19.

Sobotka, Tomas. 2003. Tempo-Quantum and Period-Cohort Interplay in Fertility Change in Europe. Evidence from the Czech Republic, Italy, the Netherlands and Sweden. Demographic Research 8(6): 151-214.

Uggen, Christopher and Jeff Manza. 2002. Democratic Contraction? Political Consequences of Felon Disenfranchisement in the United States. American Sociological Review 67: 777-803.

Wachter, Kenneth. 2005. Tempo and Its Tribulations. Demographic Research 13(9): 201-222.

Waller, Maureen. 2002. My Baby's Father: Unmarried Parents and Paternal Responsibility. Ithaca: Cornell University Press.

Walmsley, Roy. 2011. World Prison Population List (9th Edition). http://www.prisonstudies.org/images/n Accessed September 6, 2012.

Warren, Jenifer. 2008. One in 100: Behind Bars in America 2008. Washington, DC: The PEW Center on the States and the Public Safety Performance Project.

Western, Bruce. 2006. Punishment and Inequality in America. NY: The Russell Sage Foundation.

Western, Bruce. 2002. The Impact of Incarceration on Wage Mobility and Inequality. American Sociological Review 67:477-498.

Western, Bruce and Katherine Beckett. 1999. How Unregulated Is the U.S. Labor Market? The Penal System as a Labor Market Institution. American Journal of Sociology 104: 1030-60.

Western, Bruce and Leonard Lopoo. 2006. Incarceration, Marriage, and Family Life. In Punishment and Inequality in America by Bruce Western, Chapter 6. Russell Sage Foundation.

Western, Bruce, Leonard Lopoo, and Sara McLanahan. 2004. Incarceration and the Bond Between Parents in Fragile Families. In Imprisoning America: The Social Effects of Mass Incarceration, edited by Mary Pattillo, David Weiman, and Bruce Western, Chapter 2. Russell Sage Foundation.

Western, Bruce, Leonard Lopoo, and Sara McLanahan. 2004. "Incarceration and the Bond Between Parents in Fragile Families. In Imprisoning America: The Social Effects of Mass Incarceration, edited by Mary Pattillo, David Weiman, and Bruce Western, Chapter 2. Russell Sage Foundation.

Western, Bruce and Becky Pettit. 2005. Black-White Wage Inequality, Employment Rates, and Incarceration. American Journal of Sociology 111:553-578.

Western, Bruce and Christopher Wildeman. 2009. The Black Family and Mass Incarceration. The ANNALS of the American Academy of Political and Social Science 621(1): 221-242

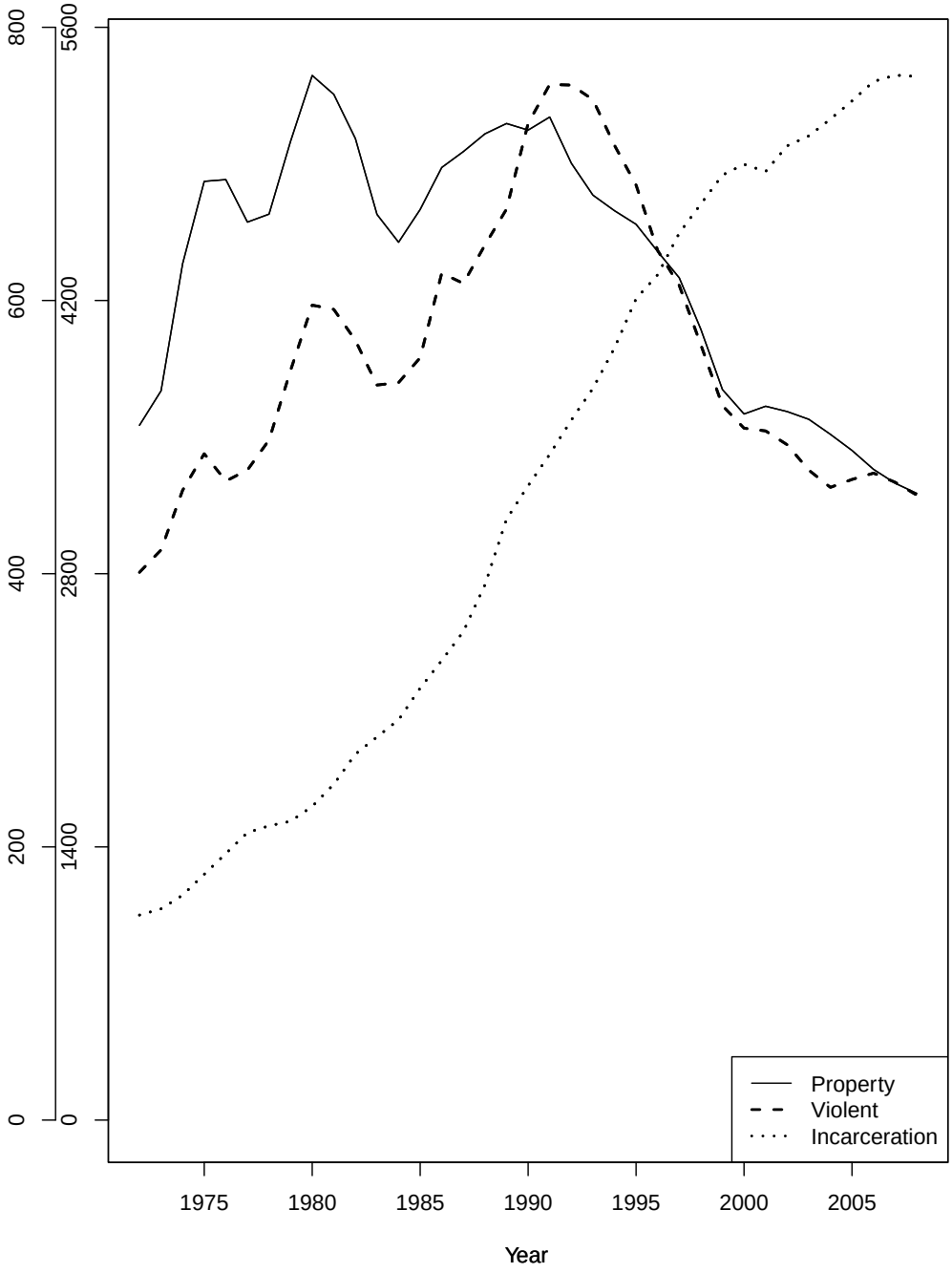
Wildeman, Christopher. 2009. Parental Imprisonment and the Concentration of Childhood Disadvantage. Demography 46(2): 265-280.

Wilson, William Julius. 1987. The Truly Disadvantaged: The Inner City, the Underclass and Public Policy. The University of Chicago Press.

Wilson, William Julius and Kathryn Neckerman. 1986. Poverty and Family Structure: The Widening Gap Between Evidence and Public Policy Issues. In Sheldon Danziger and

Daniel Weinberg (Eds.), Fighting Poverty: What Works and What Doesn't (Chapter 10). Cambridge, MA: Harvard University Press.

Figure 1: Crime and Incarceration Rates (per 100,000), United States 1972-2008



Authors' calculations using data from the Survey of Inmates, Current Population Survey, and Bureau of Justice Statistics.