Appendix: Calculation of Crimes Committed Against Neighbors by Sex Offenders

For illustrative purposes, suppose that there is only one kind of crime and that *g(c)* is the probability distribution of crimes committed by sex offenders. Further, let us suppose that there is a constant probability that, conditional on crimes being committed, they are committed against neighbors (P_N). Finally, let us suppose that there is a constant number of neighbors (N) who are potential victims, that all neighbors are equally likely to be victims, and that crime, conditional on being committed against neighbors, is committed against a single neighbor. The probability distribution of crimes committed against neighbors, *f(c)*, will then be:

$$f(c) = g(c)\frac{P_N}{N}$$

Under these assumptions, we can use data on *g(c)*, P_N, and N, to estimate *f(c)*.

If neighbors are only concerned with the increased risk of sexual offenses (Rape and Sexual Assault) associated with living near a sex offender, then the assumption that c is scalar is fairly trivial and c would represent the number of sex offenses committed by the sex offender. However, sex offenders commit many types of crime, ranging from murder to motor vehicle theft, and it seems reasonable that neighbors would be concerned with these crimes as well as sexual offenses. Unfortunately, we cannot separately calculate victimization costs for various crimes because we do not have variation in the willingness to pay to reduce the risk of various types of crime. To reduce the dimensionality of the problem, we assume that all crimes can be specified as a fraction or multiple of a sex offense. For example, victims of a presumably less severe crime, such as burglary, can be seen as suffering costs that are equivalent to a fraction of a sex offense.

If we knew the relative severity of various types of crime, specifying all crimes in terms of sex offenses would be a straightforward exercise. Because we do not know these relative severities ex ante, we must use estimates of relative victimization costs from some other source. We choose to use the estimates listed in Table 5 from Miller et al. (1996) as a rough approximation to the relative costs of victimization among different types of crime, e.g., the relative cost of assault is about 30% the cost of rape. It is important to note that, for our calculation, we only require that the *relative* costs of various crimes are estimated correctly in the Miller et al. (1996) study. We find very similar results using relative victimization cost estimates from Cohen et al. (2004). While the absolute measures of victimization costs are somewhat larger than those from Miller et al. (1996), they find very similar relative costs of crime.

In order to estimate *g(c)*, we first calculate the number and type of crimes for which sex offenders are arrested in the three years subsequent to their release from prison. This information comes from "Recidivism of Prisoners Released in 1994," a data set collected in 1998 by the Bureau of Justice Statistics on prisoners released by 15 states. This data set includes all 10,337 sex offenders who were released from these states in 1994, and gives a complete inventory of all arrests and adjudications of these offenders through 1998. These states are: Arizona, California, Delaware, Florida, Illinois, Maryland, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Oregon, Texas, and Virginia. The data set also includes a stratified sample of all other prisoners released in these states in 1994. Because this data contains offenders' entire criminal

histories, we treat as sex offenders all released prisoners who had previously been convicted of a sexual offense, not just those whose most current prison sentence was due to a sexual offense conviction. We use sampling probability weights to construct population averages. We drop offenders for whom a record of arrests and prosecutions (a "RAP sheet") was not successfully located and offenders who died during the three years following their release. We also drop a small number of offenders who had unknown arrest and adjudication dates (making it impossible to distinguish recidivism from prior criminal history) or had adjudication dates that preceded the arrest date for any given offense. Importantly, we assume that these offenders' subsequent behaviors are representative of the expected behavior of an offender in North Carolina. If Megan's Laws reduce crime, this may overstate risk. However, although crime reduction was a goal of this legislation, we know of no evidence to support this claim.

Table A.1 shows the fraction of sexual offenders and other released criminals who are arrested for various crimes during the first three years after their release from prison. Sex offenders are much more likely to be arrested for a sexual offense than other released criminals. The fraction of released sex offenders who are later arrested for rape and sexual assault are 2.1% and 4.0%, respectively. Moreover, the ratio of arrests for sex offenders vs. other criminals is over 4:1 for Rape and over 5:1 for sexual assault. Arrests of sexual offenders are similar to other released convicts for violent crime, though somewhat more likely for kidnapping and assault, and less likely for murder, manslaughter, and robbery. Arrests of sex offenders are significantly less likely for non-violent crimes such as burglary, larceny, and motor vehicle theft.

It is important to note that sample selection into this data set may overstate the frequency of arrests for all criminals at all times. Almost all of the released criminals in our data spent a year in prison for their crimes, whereas 30% of sex offenders registered in North Carolina spent less than one year in prison. Also, we examine offenders just after their release from prison, when they are most likely to recidivate. Indeed, of sexual offenders' arrests for rape and sexual assault, 37% and 49% (respectively) come in the first year after their release. These one-year statistics are also reported in Table A.1.

Not all crimes lead to arrests. In order to calculate the crimes actually committed by offenders, we use statistics from Lee and McCrary (2005) on the fraction of crimes that are reported to the police and fraction of reported crimes that lead to an arrest (Table A.2). Their calculations are based on comparisons of victimization reports from the National Crime Victimization Survey (NCVS) and crimes reported to the police and reported crimes that lead to arrests from FBI Uniform Crime Reports (UCR). (See Appendix Table 2 of their study for further explanation.) Because the NCVS and UCR data do not break out crimes into great detail, we assume that similar crimes have similar crime/arrest ratios. For example, we assume that the ratios are the same for rape and sexual assault.

According to their estimates, for every individual arrested for a sexual offense, roughly four offenses had actually been committed (i.e., there is a crime/arrest ratio of 4:1). Although we can use the estimates in Table A.2 to gauge crime/arrest ratios, we do not have estimates of the extensive and intensive margins of criminal activity. In other words, even if the crime/arrest ratio is 4:1, it may be that (intensive) all four crimes were committed by the same offender who was arrested, or it may be that (extensive) four different offenders committed one crime each, but only one offender was arrested.

We assume that the crime/arrest ratio is due entirely to the intensive margin, i.e., each arrest is indicative of multiple crimes, but non-arrested offenders do not commit crimes. Given this assumption, the empirical distribution of arrests and the estimated crime/arrest ratios are sufficient to estimate the empirical distribution of crimes committed. It is important to note that the intensive assumption—placing a larger number of crimes on a small number of offenders—will lead us towards estimates of welfare costs that are lower, given risk aversion, than assuming that some of the crime-arrest ratio is due to offenders who commit crimes but are not arrested.[1]

We estimate the fraction of crimes committed against neighbors using the fraction of victims claiming that the offender was a neighbor in the concatenated NCVS files from 1993-2004. Because the NCVS cannot ask murder or manslaughter victims about their offenders, we use the 2003 Supplemental Homicide Reports (a subset of the UCR data) to estimate offenses by neighbors for these crimes. This is, of course, only possible for crimes where the offender is known. Murder and manslaughter are not separately identified in this data, so we combine them. For murder/manslaughter, rape, and sexual assault, the fractions of offenses committed by neighbors are 0.7%, 3.7% and 6.9%, respectively (Table A.3 column 1). These figures suggest that the crime risk from neighbors may be quite small. One potential problem with these measures is that victims may not know their neighbors. The fraction of crimes committed by *both* neighbors and strangers is a possible alternate measure, but it is often an order of magnitude greater than the fraction committed by neighbors alone, and is likely to considerably overestimate crime risk from neighbors (Table A.3 column 2). Recognizing the problems inherent in both measures, we assume that the true fraction of crimes committed by neighbors is 200% of the fraction of victims that claim the offender was a neighbor. In other words, for every crime victim claiming the offender was a neighbor, another victim claimed the offender was a stranger when, in fact, the true offender was a neighbor.

We estimate the number of households in the neighborhood among which crime risk from the sex offender is spread by measuring the number of single family homes located within one tenth of a mile of offenders in Mecklenburg County. The median number of single-family homes within one tenth of a mile of offenders' parcels—at the time they moved in—is 120. This is probably an underestimate of the number of relevant households facing the increased risk of crime, since it does not include other residential structures such as condominiums, multi-family homes and apartment buildings.

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[1] This can be shown in the following manner: Suppose there is a 1/N chance of being a victim of N crimes. Indifference to this risk implies $U(w)=\frac{1}{N}U(w+d-nv)+\frac{N-1}{N}U(w+d)$, where notation follows equation 4. As N increases, the probability of being a victim falls, but the number of crimes committed per victimization rises. This is essentially the intensive margin assumption. $\frac{dv}{dN}$ is the change in the wealth equivalent value of a *single crime* that sustains the equation when N rises. Solving for $\frac{dv}{dN}$ yields an expression proportional to $\left[U(w+d)-U(w+d-nv)\right]-nvU'(w+d-nv)$. The term in brackets equals the loss in utility from victimization, which must be smaller than the second term if the agent is risk averse, i.e., if U''<0. For a risk neutral agent, $\frac{dv}{dN}$ would be zero.