Some Simple Analytics of Slave Redemption

Dean S. Karlan and Alan B. Krueger

Princeton University

The idea of purchasing the freedom of slaves is not new. Alexander Hamilton, for example, helped found the Society for Promoting the Manumission of Slaves in New York in 1785, and raised money to buy and free slaves (see Randall, 2003). The Pennsylvania Abolition Society and Quaker groups likewise purchased the freedom of a significant number of slaves. Even earlier, in the 16th century, the church issued orders to raise a considerable sum of money to redeem the freedom of Spanish and Portuguese captives held as slaves in North Africa (Eltis, 1993).

Despite the long historical precedent, slave redemption remains a controversial response to the horrible practice of slavery. Two types of slave redemption programs exist, ones that merely attempt to free a certain number of slaves, and ones that are part of a concerted effort to free all slaves and forever stop future slavery in the area. In this article, we primarily discuss the former. The United Nations Children's Fund (UNICEF) considers slave redemption efforts "absolutely intolerable" and has condemned the practice in the Sudan (Lewis 1999). UNICEF makes two claims, that purchasing slaves' freedom for money: (1) exacerbates the slave trade; and (2) does not address the root of the problem. Human Rights Watch (2002) also has denounced slave redemptions in the Sudan, citing concerns that monetary incentives could lead to more raiding of free Dinkas, although the organization acknowledges, "It has not been possible to date to ascertain whether the monetary incentive produced more raiding in practice." The group

also raises the valid concern that some of those who have been redeemed were not actually slaves.

There seems to us little doubt that redemption efforts do not address the root of the problem unless accompanied by more systematic emancipation and enforcement policies. This acknowledgment is not necessarily dispositive vis-à-vis slave redemption programs, however. From a practical standpoint one could still be interested in whether a redemption program reduces the number of slaves in captivity. This is the primary question analyzed here.

Here we apply conventional economic tools to analyze the likely effects of a slave redemption program on the quantity of slaves in captivity. Although our simple approach undoubtedly misses important features of the slave trade, we suspect it provides a good starting place for discussions of slave redemption programs. Our model applies most directly to chattel slavery, but even in situations where explicit markets for slaves do not exist, we suspect that our model provides insights into the latent costs of slave acquisition and the determinants of the number of slaves in captivity. If nothing else, our simple supply and demand framework to slave redemption highlights fundamental forces at work in a slave redemption program in a situation in which only pure economic interests are at work.

In the economic framework we describe in Section I, slave redemption programs are closely analogous to programs to repurchase high-emission cars. States such as Arizona and California have initiated programs to remove older vehicles with high rates of pollution emission and from the road. Similar programs have been used in countries such as Argentina, Canada, Denmark, Norway, Scotland, and Hungary (Dill, 2001). In

some cases owners are compensated with cash, other times with transportation vouchers or loans for new cars. These programs are designed to use the market system to reduce air pollution, and are generally viewed as having been successful (Dill, 2001). In both cases, slavery and old cars, the owner of the "property" is posing a harm to society (one a moral or ethical outrage, the other a polluting externality), and in both cases the proposed policy is to provide a financial incentive to the owner to induce him to cease inflicting this harm on society. By raising the demand for older cars and then scrapping them, the price of old cars rises and the number of old cars being used is reduced. A typical critique, just as in the slavery redemption case, is that these programs provide incentives to "create" clunkers (by holding onto cars longer than one would otherwise or import them from out of state). Likewise, slave redemption programs create an incentive for slave dealers to bring more slaves to market. The number of slaves demanded by slave holders will be diminished under a redemption program because the price of slaves is likely to rise.

In Section II, we discuss an important respect in which a slave redemption program differs from market-based pollution abatement programs: the freed slave may be scarred for life. Section III discusses cost functions and estimates of supply elasticity. Section IV concludes.

I. Basic Model

A standard economic approach to modeling the slave trade and slave redemption is to consider the supply of slaves to the "market" and the demand for slave services. The supply of slaves in a specified period of time will depend on the cost of capturing slaves

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and delivering them to market, which would include any social stigma associated with being a slave supplier. The demand for slaves by potential slave owners will depend on the value of the output that slaves produce net of monitoring and enforcement costs, boarding costs, and any stigma associated with owning slaves. The interaction of the supply and demand determines the price at which slaves are traded and the number of slaves that are bought and sold.

In a competitive market, the supply curve is determined by the marginal cost of supplying a good to the market. The supply curve for slaves likely slopes upward, as it is likely to be more costly to provide another slave to the market than it was to capture and deliver the previous slave to the market. That is, the easiest to capture, most productive slaves are captured first. On the margin, the next 100 slaves supplied to the market are likely to be more costly to provide than the previous 100. If it were costless to capture slaves – and there were enough slave providers to generate competition – the price of a slave in equilibrium would be zero because the market would be flooded with slaves.

Figure 1 illustrates the equilibrium in the slave market. The supply curve is upward sloping because, as just discussed, the marginal cost of capturing and delivering slaves is likely to be rising with the number of slaves in captivity. We will return to the polar case of an infinitely elastic (or horizontal) supply curve for slaves shortly. The demand curve is downward sloping because the demand for slaves is a derived demand, dependent on the amount of output produced by slaves. As is standard in economics – and particularly likely to hold in the agricultural markets where slaves are often forced to work – we assume that there is declining marginal productivity of labor, which necessitates that the demand curve is downward sloping.

The equilibrium (meaning the price and quantity of slaves traded that the market tends toward) is determined by the intersection of the supply and demand curves. The equilibrium price is p* and the equilibrium quantity is Q* slaves in captivity. This figure assumes an implicit set of institutions similar to those that were in place in the United States in the antebellum period – there was an active slave market in which slaves were brought to market, and slaves were exchanged at a market-determined price. To focus on a redemption program, the figure abstracts from differences in prices for slaves with different attributes, and treats slaves as homogeneous as far as slave owners are concerned.

Next we introduce a redemption program. We interpret a redemption program as follows: an outside organization steps in and purchases the freedom of X slaves, regardless of their price. After they are freed, the redeemed slaves may be instantly recaptured, or they may work as free men and women. If they are instantly recaptured and brought to market at zero cost, then there would be an infinitely elastic supply of slaves (which is inconsistent with Figure 1). If, however, some of the liberated slaves retain their freedom, and the cost of acquiring new slaves and bringing them to market is higher than the cost of supplying the last slave to the market prior to the redemption program, then the equilibrium price will rise and the number of slaves in captivity will decline.

The effect of a redemption program is illustrated in Figure 2. The slave redemption program purchases X slaves, regardless of their price, and sets them free. This causes the demand curve to shift horizontally to the right by X slaves, to D'. The supply curve reflects the marginal cost of providing slaves to market, including any freed

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slaves who are recaptured. The equilibrium number of slaves purchased (including both slaves in captivity and those redeemed) is Q'. Notice that Q' is less than Q*+X, where Q* is the number of slaves in captivity absent the redemption program. This implies that the number of slaves in captivity has declined. The number has not declined by X, however. The reason is that the quantity supplied increases. The number of slaves in captivity declines by $\Delta = Q'-Q*-X$.

The key assumptions for this result involve the slope of the supply and demand curves. If the supply curve were flat, instead of upward sloping, the number of slaves in captivity would be unchanged, despite the redemption program. Economists measure the responsiveness of supply by the elasticity of supply, or percentage change in supply for a percentage change in price. A flat supply curve corresponds to an infinite elasticity of supply. So a key concept is the supply elasticity. A redemption program will be more successful in situations where the supply curve is less elastic. It will be completely ineffective if the elasticity of supply is infinite. In Section III we will discuss how to think about determining whether the elasticity of supply is infinite.[1]

Notice another implication of the model: the price of slaves traded will rise with a redemption program if the supply elasticity is finite. This can be monitored. Thus, a more successful program will raise the price of slaves. This should be viewed as a positive result, as a higher price will discourage current slave owners from owning slaves; they would rather sell them to the redeemers. Ironically, the consequence of "raising the price of slaves" is often cited as a reason to *oppose* slave redemption, yet a

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[1] If the demand curve were vertical, or perfectly inelastic, then the redemption program would not affect the number of slaves in captivity either. The reason for this is that demand is not sensitive to price. We suspect an inelastic demand curve is unlikely, however, in the sectors where slaves are commonly forced to work.

higher price is exactly the sign one would expect if the intervention has reduced the number of slaves held in captivity; indeed, it is the mechanism by which slave ownership is reduced.

The slope of the demand curve is also relevant. The slope of the demand curve reflects the responsiveness of slave owners to a change in the cost of acquiring slaves. If the demand curve of slave owners were a vertical line, instead of a downward sloping line as shown in Figures 1 and 2, then the number of slaves purchased by slave owners would be independent of the price, and the slave redemption program would not reduce the number of slaves in captivity.

Of course, it is possible that the organization that is redeeming slaves might be swindled in that the person who is released was not actually a forced worker. Human Rights Watch reports on anecdotal evidence of children being rented or borrowed to be exchanged for cash by unscrupulous middlemen. While such fraud is certainly possible, our model considers a case in which the freedom of slaves is actually purchased. The number of freed slaves, X, may be smaller than the number of people that a slave redeemer believes has been set freed. Certainly such fraud is costly from the slave redeemer's perspective, but it does not alter the analysis. It simply means that the net effect, in terms of slaves freed, is less per dollar spent. As long as *everyone* freed under the redemption program is not a "rented" individual who was not a genuine slave, and supply and demand are not perfectly inelastic, the net effect will still be a reduction in slaves in captivity. Another way of thinking about the "fake slave" problem is to consider it a pro-rata increase in the price of freeing a true slave. If 50% of slaves

redeemed are "fake slaves", then instead of paying \$500 per freed slave, the effective price is \$1000 per freed slave.

This model undoubtedly misses much, but it provides a benchmark economic model against which to evaluate slave redemption plans. We suspect a number of relevant institutional features can be interpreted in the context of the basic supply and demand model outlined here. For example, institutional, geographic and political aspects of the environment may raise or lower the elasticity of supply of slaves.

In addition, the model helps one to evaluate claims about the success or failure of slave redemption programs. For example, Human Rights Watch's concern that slave redemption may cause increased raiding can be interpreted as a movement up the supply curve, from Q* to Q'. It would not be surprising if slave redemption caused additional people to be captured. But the purchasing and liberation of slaves could still reduce the amount of slaves in captivity, even if raiding increases as a result. The two key variables to monitor to judge the effectiveness of slave redemption are the total number of slaves in captivity and the price of slaves.

II. Extension: Scarring Effects

The analogy of redeeming slaves to repurchasing high emission cars fails when one considers the longer term damage from ever having been a slave. Anecdotal evidence, which is all that is available, suggests that some forms of slavery could have scarring effects on people who are slaves even after they are liberated. For example, Nicholas Kristof (2004) provides a wrenching report on two forced child prostitutes whose freedom he purchased, one of whom was unable to readjust to life in her original

village and voluntarily returned to prostitution. Bales (2004) provides much anecdotal evidence suggesting that many ex-slaves lead shattered lives, and often return to bondage. The fraction of freed slaves who are unable to adjust to their freedom, or whose lives are reduced to a shadow of what they otherwise would have been had they not been forced into slavery, is unknown but probably substantial.

The well-being of freed slaves is relevant because an unambiguous result of the theoretical model outlined in the previous section is that the number of people rotating through the state of slavery will increase under a slave redemption program. Thus, the number of people who were *ever* forced into slavery would be increased in a slave redemption program. If being forced to work as a slave, even briefly, leaves a permanent negative scar on individuals, then the purchase of slaves' freedom can lower welfare.

III. Cost Function: The Origin of the Supply Curve

The prior analysis suggests that an estimate of the elasticity of supply is essential for estimating the likely impact of a slave redemption program on the number of slaves held in captivity. The supply elasticity depends critically on the institutional setting and the particulars of slavery in a given society. In a competitive market, the supply curve is simply the marginal cost of capturing and delivering slaves to the market. The cost structure of supplying adult slaves in the Sudan for agricultural or household labor clearly is different than that of supplying child prostitute slaves in Southeast Asia, and different than that of supplying indentured servitudes "voluntarily." We attempt here to provide some examples and structure to organize how one might think about estimating the relevant cost curve.

We will discuss costs for two types of supplies, households (e.g., indentured servitude, where a household sells a family member in order to satisfy a debt) and slave entrepreneurs (e.g., a slave trader who captures individuals by force and sells them to others for farm, domestic, factory or prostitution labor). We start with the case of the household. The cost of supplying an additional household member to the slave market is the sum of the lost stream of revenue (through either household production, wages or self-employment income) from that individual, plus the emotional cost of selling that individual and losing his or her company. The moral, emotional and/or social stigma costs clearly are harder if not impossible to quantify, and for the sake of analysis we assume this to be linear in the quantity supplied (i.e., the same emotional cost to the families per slave provided, regardless of the total number of slaves supplied). This implies the marginal costs do not increase as supply increases. Regarding lost income, however, at a constant price it is likely that the least productive family member would be sold first, then the next most productive, and onward. The same holds when thinking about this across households: families with the least productive children (responding merely to economic incentives) will sell their children first, then those with the next most productive, and onward. This implies that the marginal cost of supplying a slave increases in the number of slaves supplied. To estimate the slope of the supply curve, one could estimate the person-by-person productivity of individuals within a household, or the productivity of individuals across households. For household production, (i.e., a farm or small enterprise), the marginal productivity of each additional worker likely decreases as we hold the physical capital in the household fixed.

Next, consider the cost function of an entrepreneur who supplies slaves. What are the costs of capturing a slave? First, if the entrepreneur buys slaves from households, then the analysis for the household applies here as well: firms will have to compensate households, and household will charge more for each person, assuming the marginal productivity of labor in the household increases with fewer members in the household (holding physical capital fixed). The slave supplier's costs also might include bribes to local officials, wages to thugs hired to capture the slaves, guns and ammunition to enforce the capture, etc. An analysis of the cost structure of such a firm would require detailed information about the constraints to growing the operation. Given the lack of institutions to enforce illegal contracts, it is likely that such operations can be only so large before it is impossible for a single owner to avoid being robbed by his own employees. So as illegal firms grow, it is plausible that the costs of supply the next slave rise.

These considerations suggest that the supply curve in many settings is unlikely to be perfectly elastic, but the precise elasticity of supply will depend on the particular circumstances.

IV. Conclusion

A slave redemption program cannot abolish slavery by itself, but it can cause a reduction in the number of slaves in captivity. If the supply elasticity of slaves to the market is finite, a slave redemption program would be expected to reduce the number of slaves in captivity and raise the price of slave ownership. By artificially increasing demand for slaves, and then setting a portion of them free, a slave redemption program

will drive up the price of slaves supplied to the market and discourage some slave-owners from holding slaves as long as the elasticity of supply is finite.

To assess the merits of these arguments, one would need two types of data: the price at which slaves are exchanged (ideally before and after redemption programs) and data on the number of slaves in captivity (again, ideally before and a redemption program). Additionally, data allowing estimation of the shape of the cost function for supplying slaves to the market would provide useful information for determining whether a slave redemption program is likely to be efficacious by enabling an estimate of the elasticity of supply.

Monitoring prices of slaves before and after a slave redemption program is implemented provides an indirect indication of the effectiveness of the program. If the price is unchanged, then either the program was too small to have any detectable effect or the supply curve was very elastic. Unless the slave market is organized and open, as it was in antebellum America, for instance, monitoring prices may be very difficult.

Still, even if data on prices are unavailable, it may be possible to collect data on costs of capturing and delivering slaves to slaveholders. As discussed above, the relevant costs depend entirely on the institutional setting of the slave market in the country of interest. For those settings in which households decide, due to abject poverty or other reasons, to sell their kin into slavery, detailed data on household production might provide some insight into the shape of the supply curve, and the likely effectiveness of a redemption program.

Of course, slave redemption could be considered morally repugnant because it requires the purchase of slaves, which could be viewed as condoning the slave trade, and

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it transfers resources to those who capture and sell slaves. But, just as paying cash for high emission cars does not indicate approval of air pollution, we think a case could be made that purchasing the freedom of slaves is a noble act. However, one would want to be sure that the net effects of the program are positive, and that the limited resources that are available for slave purchases are used in the situations where they have the greatest positive impact for welfare. The simple model we provided gives a framework for considering the effects and effectiveness of slave redemption initiatives.

Another consideration is whether slave redemption diverts attention, energy and resources of the international community from alternative means of reducing or abolishing forced labor. Slave redemption is clearly a short term solution, where the ultimate goal is the complete abolition of slavery. Slave redemption programs can help to make slavery uneconomical for slave owners by driving up the cost of slave ownership, however, and therefore help to hasten its end.

Slave redemption programs do not solve the root of the problem, which in many cases are poverty and/or poor institutions protecting human rights. Slave redemption programs could be combined with implementation of legal and political institutions which guarantee continued emancipation. This would be a solution similar to that proposed by several founding fathers of the United States, such as James Madison, who proposed: "A general emancipation of slaves ought to be — 1. Gradual. 2. Equitable, and satisfactory to the individuals immediately concerned. 3. Consistent with the existing and durable prejudices of the nation" (Madison, 1819). Madison's proposal (obviously not adopted) which may appear morally objectionable to many in hindsight, was potentially appealing to slave owners because they would have received some compensation for their

slaves. It is impossible to know whether slavery might have ended sooner, and without incurring the tremendous costs of the American Civil War, had a Madisonian approach been pursued.

Few if any slave markets today resemble the organized slave market that occurred in the United States before the Civil War, so it is questionable whether a transition plan enacted through legal channels could work in a setting such as the Sudan, for example. Nevertheless, in some settings redemption programs might reduce the net number of slaves in captivity, even after accounting for a likely movement up the supply curve, because an increase in price resulting from an external increase in demand (due to the slave redemption program) will discourage some slaveowners from purchasing or holding slaves. Nevertheless, from the standpoint of the international community, a redemption program creates a tradeoff between the flow and the stock of slaves: a redemption program probably reduces the stock of slaves in captivity at any point in time, but increases the flow of slaves in and out of slavery. Any scarring effect of time spent in the state of slavery upon freed slaves should be weighted against the salutary effect of a reduction in the number of slaves in captivity.

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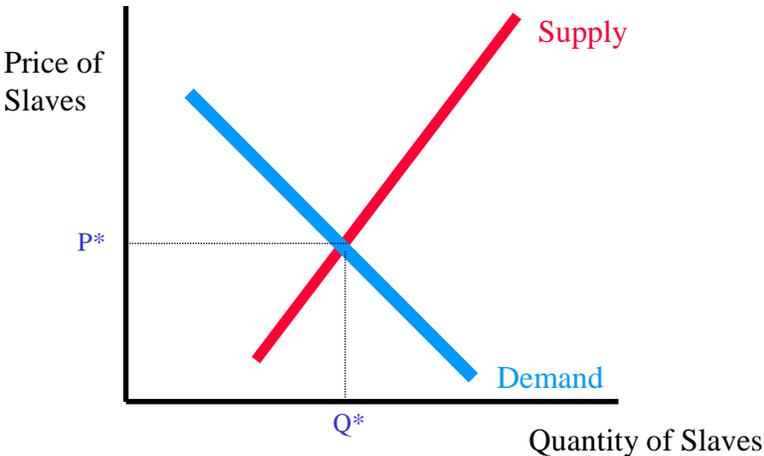# Figure 1: Demand and Supply for Slaves Absent a Slave Redemption Program

Price of Slaves

Supply

P*

Demand

Q*

Quantity of Slaves

Figure 2: Demand and Supply for Slaves
With an Slave Redemption Program