Smuggling and Trafficking of Illegal Immigrants: A Theoretical Analysis

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Abstract

Studies on illegal labor migration to rich countries are strongly policy driven and welfare-centric. Border control and employer interdiction are the most popular policies for controlling illegal entries. This predictive theory deals with illegal immigration as resulting from two distinct activities – smuggling and exploitative trafficking. This has not been discussed in the literature earlier. Tax paid by legal unskilled workers at destination finances inland monitoring against illegal immigration holding border patrol expenses at a given level. Proportions of smugglers and traffickers are determined endogenously along with optimal tax, employer penalty and market wage for illegal immigrants. Unemployment benefit offered to legal unskilled workers is treated as a policy variable and increase in it reduces illegal wage, traffickers' economic rent and flow for illegal entries in this model.

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"Sonia was invited to come to the United States by family friends and told that she could work for them as a housekeeper, and they would pay her $100.00 a week. Sonia was provided with fraudulent documents and departed for the United States with her new employer. She knew that this was illegal, but she needed the money, and was willing to take the risk. *Was Sonia smuggled or trafficked? Sonia was smuggled into the United States.* She left willingly with full knowledge that she was entering the United States illegally.
Upon arriving in the United States, Sonia was kept in isolation, she was given a place to sleep in the basement and told not to speak to anyone or she would be turned over to the Immigration Service. Sonia was never paid for her work and felt that she had no one to turn to for help. *Was Sonia smuggled or trafficked?* At this point Sonia was restricted from leaving the house, threatened with deportation if she attempted to talk to anyone, and forced into involuntary servitude. *Sonia is a victim of trafficking.*"

Excerpts from Fact Sheet, The Human Smuggling and Trafficking Center at the U.S. Department of State, Washington DC, January 1, 2005 (italics added).

1. Introduction

Illegal immigration is universally considered as an infringement on the rights of the lawful citizens of the country where such inflow takes place; a strain on the public goods provisioned with legal taxpayer's money; and in the post-9/11 world, a potential threat to national security. Besides, since illegal immigrants largely constitute of low-skilled workers, they pose strong challenges for the native and the non-native legal unskilled workers causing both unemployment and/or wage reduction. Given such compelling reasons, it is not surprising that most governments take up elaborate measures to restrict illegal immigration. It is noteworthy that presently illegal migration operates primarily through the intermediate roles played by the migrant smugglers and traffickers all over the world.

This paper offers a predictive model but strongly grounded in observed realities in many OECD countries that remain the largest recipients of undocumented immigrants. It is an attempt to understand the varying impacts of migrant *smuggling* and *trafficking* as distinct activities in a considerably large illegal system with the share of each type endogenously determined. We start with an assumption that the legal unskilled workers in the recipient country pay a tax to prevent illegal immigration that affects their job market conditions directly.[1] The optimal tax such workers decide to pay finances the government's inland monitoring, holding the border enforcement expenditure at a given level.

The objective therefore is to investigate whether such tax is a *viable* instrument of public policy that can influence the incidence of smuggling /trafficking and subsequently the 'supply' of illegal migrants from poor countries. In the process, we also account for the level of exploitation faced by illegal immigrants, which is a significant factor in the chain of events and yet analytically neglected thus far. According to Antonio Mario Costa (UNODC), "what counts mostly is the exploitation that takes place at several points along the chain as the human trafficking takes place and that is repetitive and prolonged" (BBC, 2008).[2]

Since the main purpose of the paper is to offer a start-up analytical model incorporating smuggling and trafficking, a few simplifying assumptions are used

[1] Skilled workers often vote against illegal migration since it affects general conditions of living, considered as a drain on legal tax payer's money etc., but their jobs are not directly threatened by it.

[2] Many UN member countries have not yet ratified the Anti-Trafficking Protocol, and not much is known about the scale of the activities. Yet, the UN estimates make it the third largest shadow economy after drugs and arms (BBC, 2008).

to capture the starker realities, as one can observe from a brief survey of the literature available in the next sub-section. Further complications and realistic features may be introduced at each level in future as more of these issues find suitable empirical support.

Section 1.1 discusses the relevant literature, the context of illegal immigration and exploitation under the assumption that prospective migrants cannot discern smugglers from traffickers. Section 2 is divided into several sub-sections determining the optimal tax, penalty, illegal market wage and the share of smugglers and traffickers along with the degree of exploitation. Finally, I analyze the sensitivity of these variables to the proposed tax policy. Section 3 concludes and graphical examples are offered in the appendix.

1.1 The relevant literature

There is agreement that illegal immigration, overstaying and similar attempts have increased as legal access to richer countries has steadily dwindled over time. Even with Mode 4 type of arrangements under the GATS which aids labor-scarce advanced countries to allow manufacturing and construction workers, a potential applicant is required to fulfill several stringent criteria to qualify, with the scheme typically operating on a favored nation basis.

Under the circumstances, it seems more of a possibility than ever before that the richer destinations would find it increasingly challenging to monitor and control illegal entries and this is regularly discussed in the media (BBC, 2008;

CNN, 2008, for example).[3] The reports of the United Nations estimating the number of illegal entries at 4 million every year makes a further alarming statement. Since it is agreed that illegal immigration is at least bi-modal – some are 'smuggled' and some are 'trafficked', according to UNODC the latter is the fastest growing activity in the world with profit currently estimated at $31.6 billion.

Given that the issue is both clandestine and complex, the epigraph offers an idea of how the formal definitions of the two categories are often blurred. Not surprisingly, in real life examples illegal migrants deal with misconstrued legal identities and misdirected punitive measures (BBC, 2008). We however, deviate from such overlapping definitions of smuggling and trafficking in favor of clear distinction of cases, with the example in the epigraph treated as a special case.

The critical features concerning the issue of exploitation of illegal immigrants or the explicit treatment of traffickers vis-à-vis smugglers have not been suitably dealt with in economics. Most case studies so far are legal, political and sociological documents on trafficking and exploitation (Vogel and Cyrus, 2008; McCreight, 2006; Granville, 2004; Kyle and Koslowski, 2001; Abella, 2000; IOM, 2000; Bales, 1999; etc). However, Bandopadhyay (2006) and Bandopadhyay and Bandopadhyay (2006, 1998) recently use supply side analysis as well as the role of capital mobility and etc. to recast the debate in firmer grounds where constructions in international and development economics and allied policies would be most relevant in arriving at a possible first best in terms

[3]It is however reported that the illegal Mexican entry into the USA has dropped 16 percent lately due to deployment of 3000 more border patrol and the tightening job market in construction and services (CNN, 2008).

of welfare implications of illegal migration at both ends. This analysis is preceded by Ethier (1986) which deals with trade-off between border security and employer/illegal worker apprehension in the *recipient* country as functions of the resources and effort devoted to monitoring.

Recently, Di Tommaso *et al*. (2009) offers measures of the well-being conditions of trafficked and exploited workers in Europe (using the IOM database) and discuses a number of extremely relevant policy interventions that might help to improve such conditions. On a different note, Epstein and Heizler (2007) explore the relation between minimum wage and illegal immigration in the host country to show that a rise in the minimum wage might increase the stock of the latter. They however, do not invoke the issue of exploitation. Further, Akee *et al*. (2009) estimate the extent of trafficking in women and children and note that schemes to legalize such workers and exercise ban on prostitution could backfire. Two recent papers also deal with trafficking and exploitation of child labor (Dessy and Pallage, 2003; Rogers and Swinnerton, 2008, mainly in the presence of asymmetric information) with the usual implications derived from the relationship between economic development and existence of both child labor and issues concerning out-trafficking of the same.[4] A few earlier studies showed that border control, at least for the US, has little effect on stalling illegal entries (Hanson *et al*, 1999) and cannot protect the native workers from its negative impact. Furthermore, an increase in the line-watch hours raises the probability that an illegal migrant hires a 'coyote' (migrant smugglers; see Singer and

[4] Also see Chau (2001) for evidence on about 20 countries that underwent immigration reforms. Here, the employer penalty performed poorly and was shifted on to employees in the form of lower wages.

Massey, 1997; and Guzman *et al*., 2006).

It should be pointed out that none of these papers discuss the dual presence of traffickers and smugglers, which according to us is an important determinant of exploitation faced by illegal entrants. We argue that the presence of both traffickers and smugglers crucially affect a prospective immigrants' choice about illegal migration.

In terms of concrete policy prescriptions to combat illegal entries in the form of trafficking and smuggling, several options have been considered in OECD countries. Tapinos (1999, 2000) argues that raising minimum wages and stringent formal labor market regulations influences many employers to recruit illegal workers. According to Tapinos (1999), "This crowding out affects legal immigrants and national low-wage earners alike, compromising their work-related advantages and undermining their job security, particularly when unemployment is high." The policies further include statutory requirements such as informing the government agencies prior to hiring, but also *fiscal incentives* to firms in favor of hiring legal workers.

We discuss an alternative. However, there is no empirical evidence from any country following this mechanism. This makes the scope of the analysis predictive in nature. We assume the following. Suppose income tax deductions from unskilled workers who are most vulnerable to illegal immigration serves two purposes: (a) finance inland monitoring and (b) provide unemployment benefit to workers if jobs are lost due to illegal immigration. There is a parallel to case (b) currently practiced in some developed countries. It is called trade adjustment

assistance (TAA) and covers workers who lost jobs due to import liberalization (see, Davidson and Matusz, 2006). We argue that an exogenous raise in the rate of unemployment benefit lowers the tax rate chosen, raises the penalty levied on employers of illegal workers, an lowers the market clearing illegal wage. It also lowers the returns to rent-seeking traffickers, but raises presence of smugglers – the distinction is discussed below. Overall, it lowers the expected return from illegal migration and reduces illegal entries.

In the absence of received empirical evidence in this matter, our approach is expected to stimulate empirical work viewing unemployment benefit as an important policy parameter.

2. The Model

The model and results are developed through several interlinked steps that relate income tax paid by legal unskilled workers to the various facets of illegal migration. The legal *skilled* workers are left out of the picture mainly because they are only indirectly affected by illegal immigration. The steps are as follows: *first*, determine the optimal tax paid by legal workers to maximize their indirect utility in the presence of an exogenous unemployment benefit rate. The tax finances monitoring against illegal migration. Second, the tax helps to determine the penalty levied on the employers of illegal immigrants that keeps the government's budget balanced. Instead of an explicit objective function for the government, we assume a social planner who (see Ethier, 1986, p. 59) intends to minimize number of illegal workers for various reasons. Third, the penalty levied

determines the market clearing wage for illegal workers. Four, the illegal market wage determines the share of smugglers and traffickers (distinguished in terms of 'critical' exploitative power) in the system. Five, the returns of smugglers and traffickers determines expected returns accruing to potential migrants. The effect of a change in the rate of unemployment benefit affects each of these endogenous variables. All through, we hold the other expenses incurred by the government, including cost of border patrol at their pre-existing levels. The procedure helps to lower the choice of monitoring facing the social planner.

The crucial assumptions that support the model include: unskilled workers – native or illegal – are perfect substitutes. There is no labor union for the legal unskilled workers, and they receive a minimum wage, *w*. Thus, illegal migration affects only the *employment* of unskilled workers, as wages cannot go below the minimum level. With some probability the legal worker loses job due to illegal entries and qualifies for the unemployment benefit.[5] The model is construed as a host country problem.

A schematic structure of the payoffs facing the migrant, the local employers and the smugglers/traffickers is depicted in figure 1 while the detailed model is presented in the following sub-sections.

2.1 *Optimal Tax, Penalty and Illegal Wage*

The legal unskilled workers pay a tax, *t* and are entitled to unemployment benefit at the rate $0 < \beta \leq 1$ as percentage of *w* Consider, that the legal workers

[5] The probability of losing job is a function of the rate of apprehension of illegal migrants, as we show shortly. The probability may also be based on the prevailing level of unskilled unemployment in the economy in the spirit of the well-known Harris-Todaro model and further affected by illegal entries (see, Ethier, 1986, for this treatment).

are risk averse, and their utility function is of the form,

$U(.) = [U(-e^{-W})],\ U' > 0, U'' < 0$, where *W* is income. The per unit tax revenue influences the probability of inland capture. Thus, with probability λ_E

$[\lambda_E = \lambda_E(t),\ \lambda_E' > 0, \lambda'' = 0_E, \eta_{t^*}^{\lambda_E} = \frac{\delta\lambda_E}{\delta t^*}\frac{t^*}{\lambda_E} \approx 0]$ the illegal migrant is captured and the legal worker earns a post-tax income equal to (*w*-*tw*). However, the probability of apprehension is not very sensitive to per unit tax rate, meaning that the positive relationship is flat and inelastic (Ethier, 1986, assumes a second-order decreasing rate for apprehension, p. 58). With probability $(1-\lambda_E)$ the state fails to capture the illegal immigrant such that the legal worker loses job, and receives βw. Using these two conditions the *indirect* expected utility of income (U_N) of a legal unskilled worker is:

$$\underset{t}{Max}\ \ E(U_N) = \lambda_E[-e^{-w(1-t)}] + [1-\lambda_E](-e^{-(\beta w)}) \qquad (1)$$

Without loss of generality hold *w*=1 and given β any change in $E(U_N)$ will result from a change in *t* only. From (1), it is possible to find the tax rate that maximizes the expected income; the agent being risk averse, $U_t'' < 0$ everywhere, $E(U_N)$ has a unique maximum[6]. Thus, from the first order condition

$$\frac{\delta}{\delta t}[E(U_N)] = -\lambda_E'[e^{-(1-t)} - e^{-\beta}] - \lambda_E e^{-(1-t)} = 0 \qquad (1a)$$

we obtain a unique positive value of *t*. Then, if for example, $\lambda_E = (t)^2$,

[6] See Fig. A.1 in appendix for depiction of $E(U_N)$ at $\beta = 0.5$ *and* $\lambda_E = (t)^2$

$t^* = -2 + LambertW\left[2e^{(3-\beta)}\right] > 0$ *for* $\beta < 1$.[7] So, $t^* = t^*(\beta)$; $t^{*\prime} < 0, t^{*\prime\prime} > 0$. If the government raises β, t^* must fall. We calculate this optimal penalty next.

Optimal penalty for employers

We assume that all agents engaged in smuggling and trafficking hold legal rights to enter the country of destination themselves and incur a flat total cost *C* for arranging the migrant's entry to the foreign country. Let the exogenous probability of border interdiction for the migrant be $0 < \lambda_m < 1$. If the border crossing is successful, the migrant pays a fee *M*. The migrant is not finance constrained, but does not pay any fee until successful border crossing,[8] such that the agent receives (*M*-*C*) with probability $(1 - \lambda_m)$.

As we have already considered, $0 < \lambda_E < 1$ is the *endogenous* probability of being apprehended inland for employing illegal immigrants and if charged, the employer must pay a penalty p_E. This is also true for native employers of illegal migrants in addition to traffickers who need not be natives of that country. Given t^* optimal penalty is calculated from the balanced budget constraint (*B*) facing the government. *B* includes revenue from penalty (p_E), a fixed per unit cost of monitoring, $\phi > t$, and the payment of unemployment benefits in case of job loss among the native unskilled.[9] Therefore, the government receives

[7] We provide an explanation of *LambertW* function in the appendix along with the functional form that $t^* = t^*(\beta)$ follows given restrictions on *t* and β.

[8] Such arrangement hints at the risk borne by the agent. Partial pre-payment by migrants implies a sunk cost and can alter the decision problem considerably, which is not considered here.

[9] It is reasonable to assume that per unit cost of monitoring is higher than the optimal tax, otherwise there should be no need for penalizing the employers of illegal aliens.

$(t^* + p_E - \phi)$ in case of capture with probability λ_E, or, $(t^* - \beta - \phi)$ in case of failure with probability $(1-\lambda_E)$. Thus, the balanced budget condition is given by: $B = \lambda_E(t^* + p_E - \phi) + (1-\lambda_E)(t^* - \beta - \phi) = 0$, which solves for

$$p_E^* = \frac{(\phi - t^*)}{\lambda_E(t^*)} + \frac{1-\lambda_E(t^*)}{\lambda_E(t^*)}\beta \qquad (2)$$

Given $\phi > t^*$, $p_E^* > 0$ and $\frac{\delta p_E^*}{\delta \phi} > 0$. As t^* is already determined by β, so is p_E^*. Thus, an exogenous increase in the unemployment benefit offered by the government should raise the optimal penalty levied

$$\frac{dp_E^*}{d\beta} = \frac{\left[\{-\frac{\delta t^*}{\delta \beta} + (1-\lambda_E(t^*)\} + \beta\lambda_E(t^*)(-\frac{\delta \lambda_E}{\delta t^*}\frac{\delta t^*}{\delta \beta}) - \{\phi - t^* + \beta(1-\lambda_E(t^*)\}(\frac{\delta \lambda_E}{\delta t^*}\frac{\delta t^*}{\delta \beta})\right]}{[\lambda_E(t^*)]^2} \qquad (2a)$$

Of which, since $\frac{\delta \lambda_E}{\delta t^*} > 0$, $\frac{\delta t^*}{\delta \beta} < 0$, $\frac{dp_E^*}{d\beta} > 0$, i.e., not unexpectedly a rise in β must increase p_E^*.

Market wage for illegal workers

Intuitively, there is no reason why the employers of illegal immigrants would pay them the local minimum wage. Empirically also, they are always paid much less than that. We show here, how that wage is calculated. For this purpose, hold the expected per worker rent accruing to local employers (*LE*) at zero as would be the case under perfect competition in the market for illegal labor. We introduce two more assumptions at this point. If the illegal migrant enters with the aid of a smuggler, he/she joins a local employer and the smuggler receives a commission α from the employer. Conversely, if he/she is trafficked

into the host country the immigrant is retained by the trafficker and not hired by *LE*. Thus the expected per worker rent enjoyed by local employers of one illegal immigrant is,

$$E(\pi)_{LE} = (1-\lambda_E)(1-\alpha)(1-w_I) + \lambda_E(-p_E^*) = 0 \qquad (3)$$

where, $(1-\alpha)$ is the share of the profit retained by the employer after paying a commission $0<\alpha<1$ to the smuggler; $(1-\lambda_E)$ is the probability that the employer is not captured; and $(1-w_I)$ is the gap between legal and illegal wages. Substituting p_E^* in (3),

$$w_I^* = 1-\left[\frac{\lambda_E p_E^*}{(1-\alpha)(1-\lambda_E)}\right] \qquad (4)$$

or, $(1-w_I^*)>0$, implying that the illegal wage must be lower than the legal minimum wage, as long as there is positive penalty for hiring illegal workers. An exogenous increase in the unemployment benefit renders two possible effects on illegal wage: (a) a negative effect via an increase in penalty and (b) a positive effect due to lower *t** and hence lower $\lambda_E(t^*)$.

Substituting (2) in (4) and differentiating with respect to β, we get,

$$\frac{dw_I^*}{d\beta} = -\frac{1}{1-\alpha}\left[\frac{\lambda_E' t^{*\prime}}{(1-\lambda_E)^2} p_E^* + \frac{\lambda_E}{1-\lambda_E}\frac{\delta p_E^*}{\delta\beta}\right]$$

i.e., $\frac{dw_I^*}{d\beta} \gtreqless 0,\ iff,\ \frac{\lambda_E' t^{*\prime}}{(1-\lambda_E)^2} p_E^* \lessgtr -\frac{\lambda_E}{1-\lambda_E}\frac{\delta p_E^*}{\delta\beta}$

such that, $\frac{dw_I^*}{d\beta} \gtreqless 0,\ iff,\ \eta_{t^*}^{\lambda_E}\eta_{\beta}^{t^*} \lessgtr -\eta_{\beta}^{p_E^*}(1-\lambda_E)$ (4a)

where, $\eta_{t^*}^{\lambda_E} = \frac{\delta\lambda_E}{\delta t^*}\frac{t^*}{\lambda_E}$, $\eta_{\beta}^{t^*} = \frac{\delta t^*}{\delta\beta}\frac{\beta}{t^*}$ is the elasticity of optimal tax to unemployment benefit and, $\eta_{\beta}^{p_E^*}$ is the elasticity of penalty to changes in unemployment benefit. Since we have assumed, $\eta_{t^*}^{\lambda_E} \approx 0$, $\eta_{t^*}^{\lambda_E}\eta_{\beta}^{t^*} > -\eta_{\beta}^{p_E^*}(1-\lambda_E)$, so that, $\frac{dw_I^*}{d\beta} < 0$. Thus, higher the unemployment benefit, lower is the market wage for illegal workers.

Result 1: *Given* β *and* $t^*(\beta)$, $\exists\ p_E^* > 0$ and $w_I^* < w$ *both of which are unique, such that, the government's budget is balanced and* $\frac{dp_E^*}{d\beta} > 0$, *while* $\frac{dw_I^*}{d\beta} < 0$.

Proof: See discussion above.

2.2 *Smugglers, Traffickers and Illegal Immigrants*

Consider now a representative unskilled worker living in a poor country and intending to undertake cross-border migration illegally. The migrant cannot undertake this journey on her own due to several reasons discussed earlier, and hires an agent. She is self-financed and can take decisions independently of the household she belongs to. The border-crossing 'service' is provided by two types of agents: (i) migrant smugglers, (ii) migrant traffickers. The basic difference between a smuggler and a trafficker arises from their individual rent extracting or 'exploitative' capacities. We assume that potentially all smugglers are traffickers,

but one becomes a trafficker only if his rent extracting capacity exceeds a critical level. Exploitation occurs when an agent employs and economically exploits a migrant after trafficking her to a foreign country. So, the trafficker not only smuggles the worker across borders but also retains her in his own business. If the agent is a smuggler only, he receives a fee against the border-crossing service provided and a commission for supplying them to the local employers as already discussed.

Indeed, there is a thin line between local employers and traffickers when it comes to exploitative treatment mainly in the form of lower wages.[10] Under a trafficker the migrant is treated more like a bonded labor and earns even lower than w_I, her outside option. In other words, if the migrant is trafficked a portion of the illegal market wage (w_I) is retained by the trafficker as manifestation of exploitative treatments. Both the local employer and the trafficker face chance of discovery by the inland monitoring authorities and face penalty.

Determination of critical exploitative power

As the more descriptive literature on the subject cited above reveals, traffickers command additional resources that contribute to their exploitative power. We assume that the mass of smugglers/traffickers is distributed uniformly over this power measured by $k \in (0,1]$, with *f(k)* as the probability density function implying that one with a low *k* has no exploitative power, while one with

[10] Chau (2001) argues that lower wage for the illegal worker is a result of risk sharing arrangement with the employer and Karlson and Katz (2004) contend that threat to reveal the true type leads to a lower illegal wage as an equilibrium outcome. In both cases, the illegal status of the worker is fully known to the local employers. See Ethier (1986) when legal status is private information to immigrants.

$k \to 1$has high exploitative power.[11] Determination of the types and proportion of such agents are therefore endogenous to the system.

All traffickers (*T*) face p_E^* and w_I^*, and earn the following expected rent [$E(\pi)_T$] from employing one illegal immigrant,

$$E(\pi)_T = (1-\lambda_m)[M - C + (1-\lambda_E)(-w_I^* + kw_I^* + 1) + \lambda_E(-p_E^*)] + \lambda_m(-C) \qquad (5)$$

where, $(1-\lambda_m)$, $(1-\lambda_E)$ and *w*=1 are as above; *k* is the exploitative power of a trafficker and $\lambda_m(-C)$ as the loss incurred when the border crossing is unsuccessful, and $E_K'(\pi)_T > 0$, $E_K''(\pi)_T = 0$. Here, the trafficker is aware of w_I^* and calculates his 'exploitative rent' on the basis of the share he can extract over the market wage for illegal immigrants. For example, trafficked women are used almost as slaves. Under extreme circumstances, *k*=1 and the trafficker retains the entire product. In less extreme cases, *k* <1.

On the other hand, a smuggler's (*S*) expected profit is:

$$E(\pi)_S = (1-\lambda_m)[M - C + \alpha(1-w_I^*)] + \lambda_m(-C) \qquad (6)$$

Therefore, there is a value of *k* which would influence the decision towards becoming a smuggler vis-à-vis a trafficker. Equations (5) and (6) determine this critical value (*k**). All agents distributed with $k \le k^*$ would become smugglers, while those with $k > k^*$ would be traffickers. Using (5) and (6) it is obvious that, $E(\pi)_T > E(\pi)_S$ if,

$$(1-\lambda_E)(-w_I^* + kw_I^* + 1) + \lambda_E(-p_E^*) > \alpha(1-w_I^*) \qquad (7)$$

[11] It is possible that the level of *k* also affects the probability of inland capture of a trafficker and it is usually the case in corrupt regimes. We avoid modeling the problem in this direction and hold the probability of inland capture as free from individual influences.

However, from (3) manipulating,

$$(1-\lambda_E)(-w_I^*+1)+\lambda_E(-p_E^*)=\alpha(1-\lambda_E)(1-w_I^*) \quad (7a)$$

Re-writing (7a):

$$(1-\lambda_E)(1-w_I^*+kw_I^*)+\lambda_E(-p_E^*)=(1-\lambda_E)kw_I^*+\alpha(1-\lambda_E)(1-w_I^*) \quad (7b)$$

Using (7) and (7b): $(1-\lambda_E)kw_I^*+\alpha(1-\lambda_E)(1-w_I^*)>\alpha(1-w_I^*)$ (7c)

Or, $E(\pi)_T > E(\pi)_S$, iff, $(1-\lambda_E)kw_I^* > \alpha\lambda_E(1-w_I^*)$.

This is certainly true if $\alpha = 0$, and then it is best to be a trafficker always.

However, if $\alpha > 0$, i.e. there exists a positive commission for smugglers, then one can obtain the equilibrium value of *k* in terms of α; these determining the returns from trafficking and smuggling respectively. So, for $\alpha > 0$,

$$(1-\lambda_E)kw_I^* = \alpha\lambda_E(1-w_I^*)$$

And,
$$k^* = \alpha\left(\frac{1-w_I^*}{w_I^*}\right)\left[\frac{\lambda_E}{1-\lambda_E}\right] \quad (7d)$$

Now, differentiating with respect to β, we get,

$$\frac{dk^*}{d\beta}\gtrless 0,\ iff,\ \left(\frac{\delta\lambda_E}{\delta t^*}\frac{t^*}{\beta}\right)\left(\frac{\delta t^*}{\delta\beta}\frac{\beta}{t^*}\right)\gtrless\frac{(1-\lambda_E)^2}{w_I^*}\frac{\delta w_I^*}{\delta\beta}\frac{\beta}{w_I^*} \quad (8)$$

Reorganizing according to the elasticity definitions above:

$$\frac{dk^*}{d\beta}\gtrless 0,\ iff,\ (\eta_{t^*}^{\lambda_E})(\eta_{\beta}^{t^*})\gtrless\frac{(1-\lambda_E)^2}{w_I^*}\frac{\delta w_I^*}{\delta\beta}\frac{\beta}{w_I^*}$$

Since, $\frac{\delta w_I^*}{\delta\beta} < 0$ and $\eta_{t^*}^{\lambda_E} \approx 0$, $\frac{dk^*}{d\beta} > 0$.

Since *k* is uniformly distributed over a mass of population normalized to 1, i.e.,

$k \in (0,1]$, the smugglers are $\int_0^{k^*} f(k)dk = k^*$ in proportion while the traffickers are $\int_{k^*}^{1} f(k)dk = [k]_{k^*}^{1} = 1 - k^*$ in proportion. A rise in k^* (i.e., $k^* \to 1$) implies an increase in the share of smugglers in the system.[12]

Result 2: *A rise in the rate of unemployment benefit lowers the existence of exploitative traffickers in the system by raising the level of penalty and lowering the illegal wage*.

Proof: Above discussion.

2.3. *Illegal Migrants*

The above results do not tell us how they affect the intentions to undertake illegal migration. For that, we need to specify the migrant's side of the problem explicitly. Once the share of smugglers-traffickers is determined, each migrant faces the probability (k^*) of ending up with a smuggler and the probability of (1-k^*) of being picked up by a trafficker.

Ex ante the prospective migrant does not know whether she will end up with a smuggler only or with a trafficker. In other words, the agent's type is private information and the potential migrant is uninformed about the true type.

On the other hand, the smugglers and traffickers face a competitive market

[12] Suppose, k^*=0.5 initially and then it rises to 0.6. It implies that those distributed in the range (0, 0.5), i.e., 50 %, are smugglers initially and that this share increases to 60 % as the range shifts to (0, 0.6) due to a rise in k^*.

and smugglers cannot signal their true type with a market price higher than the going fee. Thus we also ignore the use of middlemen or intermediaries who work on the basis of reputation among their clientele.[13] Practically, therefore, consider a possibility where both smugglers and traffickers advertise as aide in cross border migration illegally and quote the same price. The migrants never know the true identity of the agent and undertake perilous journey for crossing the border and cannot send back useful information instantaneously to prospective immigrants back home. The true identity of the agent always remains unknown to future migrants and corroborates the feature that this is largely a clandestine activity. So, every migrant faces the same degree of asymmetric information when contacting an agent.

If the migrant overestimates (underestimates) k^*, she would contemplate a higher (lower) than the actual expected income in deciding whether to migrate or not. While the overestimation would always lead to migration, the underestimation may not. Therefore, positive level of migration depends on some $k^*_{\min}$ obtained by equating the expected income in the foreign country as an illegal migrant, to that earned at home. Suppose the migrant's perception of $k^*_{\min}$ is sufficiently high to allow migration (meaning, they expect to be picked up by a smuggler with high probability; see appendix for derivation of $k^*_{\min}$ which uses equation 10 below). However, even if true $k^*=0$ (i.e. all traffickers), the migrant may still earn a foreign income higher than the domestic income, so it may not be

[13] We shelve the role of reputation and signaling for future attention.

unreasonable to hold $k^*_{\min} = 0$ for migration to be positive.[14]

Therefore, once the migrant crosses border successfully with probability $(1-\lambda_m)$, she earns (w_I^*) with probability (k^*), i.e. if she ends up with a smuggler and subsequently with a local employer and is not apprehended inland (with probability $1-\lambda_E$). If apprehended along with the employer, the migrant is deported and loses the fee *M*. Thus the expected income of such migrants who end up with local employers is given by:

$$E(Y_m^S) = k^*[(1-\lambda_E)w_I^* + \lambda_E(-M)] \qquad (9a)$$

Conversely, she may end up with an exploitative trafficker with probability (1-*k**), in which case her income would depend upon the value of $k > k^*$ which this particular trafficker commands. For example, if the *specific trafficker* has a very high *k* in the neighborhood of 1, then the migrant would earn close to nothing and conversely for low *k*. Thus, for all migrants who may end up with traffickers the income earned is an expectation of the *average income* over the truncated (from left) distribution of g(*k*) above *k** with probability $(1-\lambda_E)$.[15] If captured on the border, they earn (-*M*) with probability (λ_E).

The *average* exploitative power is therefore, given

[14] Since trafficking usually ends up in forced prostitution and bonded labor, migrants may choose not to migrate without a high perception of *k**. We do not have sufficient materials to understand how such perceptions are formed and this may be taken up for future research.

[15] Here for *k* uniformly distributed between *k** and 1, $g(k) = \frac{1}{1-k^*}$ and not equal to 1 as for the previous pdf, since this a truncated group different from the initial group.

by: $\frac{\int_{k^*}^{1} kg(k)dk}{\int_{k^*}^{1} g(k)dk} = \frac{1}{2}(1+k^*)$. Since the immigrant does not know the true exploitative power of the trafficker she will match up with, she bases her calculation on the average exploitative power, in the continuum of k^* to 1, among all possible traffickers, i.e., 1-k^*. This is also the probability of getting matched with a trafficker. Thus, the expected income of an immigrant when matched to a trafficker is:

$$E(Y_m^T) = (1-k^*)[(1-\lambda_E)w_I^*(1-\frac{1+k^*}{2}) + \lambda_E(-M)]$$

or, $$E(Y_m^T) = (1-k^*)[(1-\lambda_E)\frac{w_I^*}{2}(1-k^*) + \lambda_E(-M)] \quad (9b)$$

Thus, we may write the expected foreign income facing each migrant as (using 9a and 9b): $E(Y_m^F) = (1-\lambda_m)[E(Y_m^T) + E(Y_m^S)]$.

Or, $$E(Y_m^F) = (1-\lambda_m)[(1-\lambda_E)\frac{w_I^*}{2}(1+k^{*2}) - \lambda_E M] \quad (10)$$

Such that, $\frac{\delta E(Y_m)}{\delta k^*} = (1-\lambda_m)(1-\lambda_E)w_I^* k^* > 0$, and

$\frac{\delta^2 E(Y_m)}{\delta k^{*2}} = (1-\lambda_m)(1-\lambda_E)w_I^* > 0$.

Result 3: *The expected foreign income of an illegal immigrant is increasing in the share of smugglers in the system.*

Proof. See above discussion.

Relation between β and expected income of illegal immigrants

Finally, consider the effect of a change in β on the expected income and hence migration decisions by illegal immigrants.

$$\frac{\delta E(Y_m^F)}{\delta\beta} = (1-\lambda_m)[-\frac{1}{2}\frac{\delta\lambda_E}{\delta t^*}\frac{\delta t^*}{\delta\beta}\frac{t^*}{\lambda_E}\frac{\beta}{t^*}\frac{\lambda_E}{\beta}w_I^*(1+k^{*2}) + \frac{1-\lambda_E}{2}(1+k^{*2})\frac{\delta w_I^*}{\delta\beta} + (1-\lambda_E)w_I^* k^*\frac{\delta k^*}{\delta\beta} - M\frac{\delta\lambda_E}{\delta t^*}\frac{\delta t^*}{\delta\beta}\frac{t^*}{\lambda_E}\frac{\beta}{t^*}\frac{\lambda_E}{\beta}] \quad (11)$$

Thus, with $\eta_{t^*}^{\lambda_E} \approx 0$ (11) reduces to,

$$\frac{\delta E(Y_m^F)}{\delta\beta} = (1-\lambda_m)[\frac{1-\lambda_E}{2}(1+k^{*2})\frac{\delta w_I^*}{\delta\beta} + (1-\lambda_E)w_I^* k^*\frac{\delta k^*}{\delta\beta}].$$ So,

$$\frac{\delta E(Y_m^F)}{\delta\beta} \gtrless 0, \text{ iff }, [\frac{1-\lambda_E}{2}(1+k^{*2})\frac{\delta w_I^*}{\delta\beta} + (1-\lambda_E)w_I^* k^*\frac{\delta k^*}{\delta\beta}] \gtrless 0.$$ Hence,

with $\frac{\delta k^*}{\delta\beta} > 0$, and $\frac{\delta w_I^*}{\delta\beta} < 0$,

$$\frac{\delta E(Y_m^F)}{\delta\beta} \gtrless 0, \text{ iff }, \frac{\frac{\delta w_I^*}{\delta\beta}}{\frac{\delta k^*}{\delta\beta}} \gtrless -\frac{2w_I^* k^*}{(1+k^{*2})} \quad (12)$$

This is an empirical question and since such statistical/experimental exercise is beyond the scope of this paper, we only observe that a rise in unemployment benefit may lower the expected foreign income of immigrants if the LHS of condition (12) is lower than the RHS. Consequently, it implies that a rise in the unemployment benefit may help to subdue illegal migration. This is feasible only if the negative income effect of lower illegal wage is strong enough to outweigh the positive impacts rendered by a fall in the share of traffickers (or rise in

smugglers).

Result 4: *A rise in β increases the share of smugglers in the system and at the same time lowers the expected income facing migrants. Thus, it reduces both exploitation and the inflow of illegal migrants.*

Proof: See discussion above.

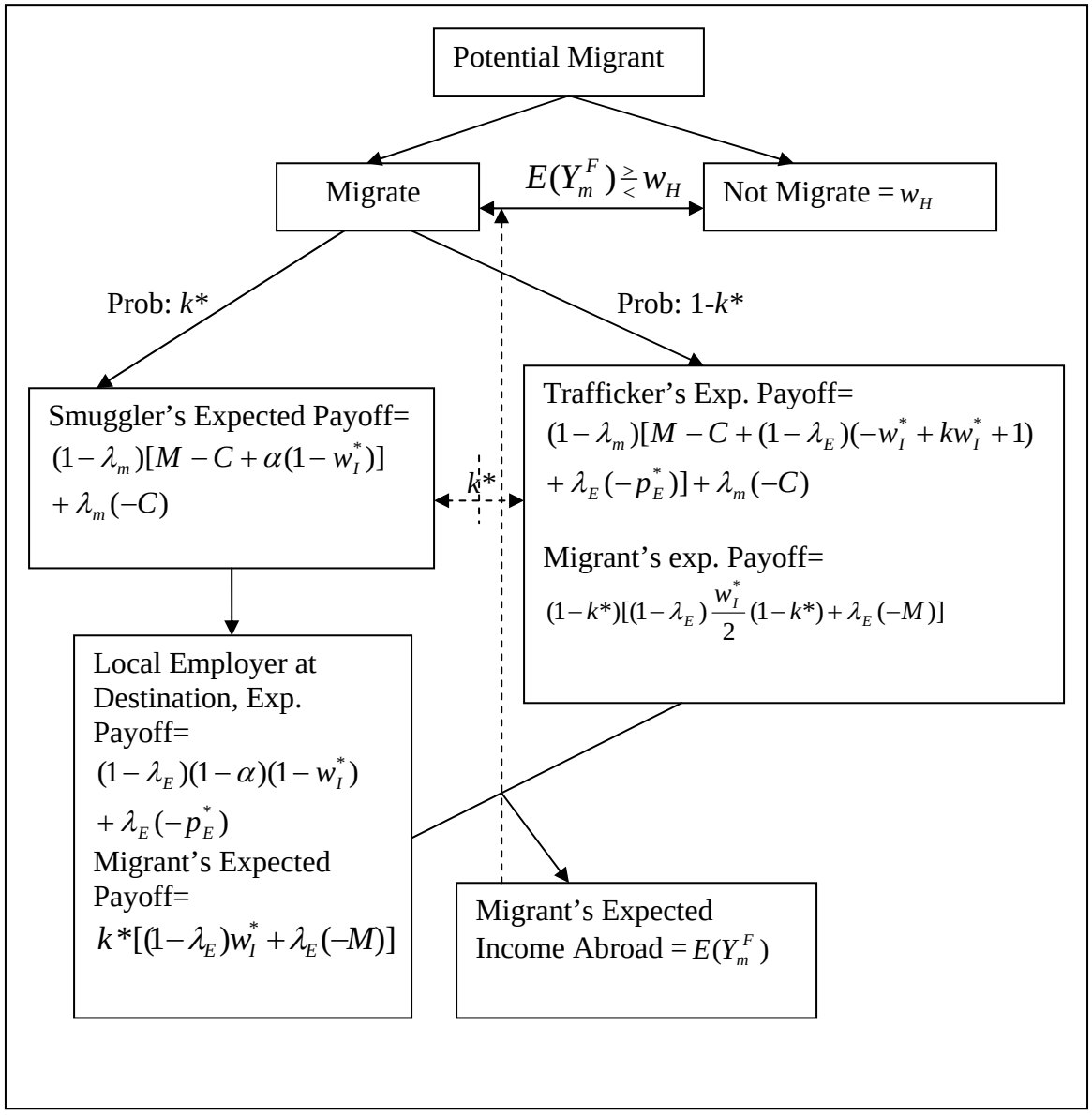
3. Concluding Remarks

To recall statements from UNODC, the problem discussed in this paper is the 'tip of the iceberg' requiring much more theoretical and empirical research for comprehensibility. This paper is an attempt to understand if there is a way to distinguish between smugglers and traffickers. Furthermore, it analyzes if the pressure of illegal immigration can be reduced by using host country uses labor market policies as an instrument.

We discussed various steps to show that if taxes from legal unskilled workers are spent only on inland monitoring and unemployment benefits, then several results follow in the presence of illegal immigration. First, a rise in unemployment benefit lowers the tax burden and raises employer penalty for hiring illegal workers. Second, it lowers the market wage for illegal workers and raises the critical exploitative rent in the illegal system. Third, this lowers the share of traffickers and raises the share of smugglers. However, the drop in expected wage may be strong enough to lower the inflow of illegal workers in the host country.

In brief, the results are both new and revealing. Admittedly, there is empirical support in favor of these results and we expect that this might prove worthwhile for collection of adequate data and empirical investigation in future. This must also follow a caveat. Unless the chain of events follow close resemblance to the one offered here or appropriate proxies are generated, simply by looking at the relation between unemployment benefit and extent of illegal entries would most likely yield results opposite to what we discussed. Finally, the structure may also be extended in several directions by bringing in immigrant amnesty, participation of skilled workers in combating illegal migration and issues of similar practical importance.

Figure 1: Expected payoffs of migrants, agents and local employers



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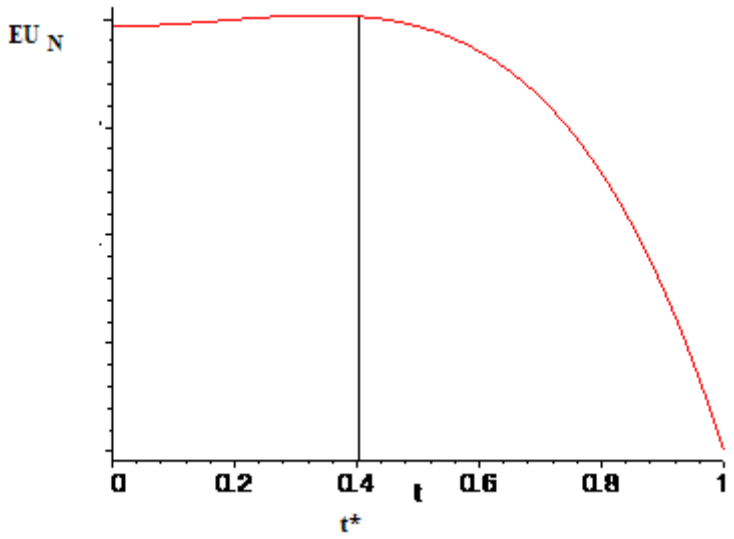
Appendix

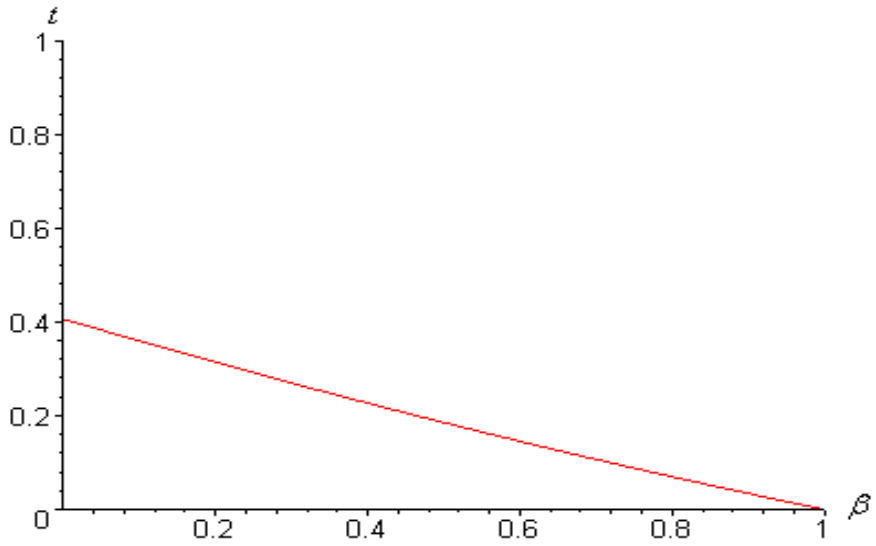
Figure A.1. Relationship between Expected Utility [$E(U_N)$] and t



Note: The diagram is drawn at $\beta = 0.5$ and w=1, for,

$$\underset{t}{Max}\ \ E(U_N) = \lambda_E(t^*)[-e^{-w(1-t)}] + [1-\lambda_E(t^*)](-e^{-(\beta w)})$$

Figure A.2. Utility Maximizing Relationship between β *and* t^*



- *Note on LambertW and* $t^* = -2 + LambertW\left[2e^{(3-\beta)}\right]$**:-**

  As the equation $ye^{y} = x$ has an infinite number of solutions: one y for each

(non-zero) value of *x*, 'LambertW' has an infinite number of branches. The LambertW function, also called the omega function, is the inverse of $f(y) = ye^{y}$. Exactly one of these branches is analytic at zero. This branch is referred to as the principal branch of LambertW and is denoted by *LambertW(x)*, such that, $LambertW(x).\exp(LambertW(x)) = x$. Examples: *LambertW(0)=0*; $LambertW(-e^{-1}) = -1$. In our case, as $LambertW\left[2e^{(3-\beta)}\right] \to 2$, $t^* \to 0$. This in other words implies that, as $\beta \to 1$, $t^* \to 0$, which is also reflected in figure A.2.

- *Derivation of* $k^*_{\min}$

$$E(Y_m^F) = (1-\lambda_m)[(1-\lambda_E)\frac{w_I^*}{2}(1+k^{*2}) - \lambda_E M] = \lambda_m(w_H) = E(Y_m^H)$$

Such that, $k^*_{\min} = \sqrt{\dfrac{2\lambda_m w_H + (1-\lambda_m)[\lambda_E M - (1-\lambda_E)w_I^*]}{(1-\lambda_m)(1-\lambda_E)w_I^*}}$
