ECONOMIC INCENTIVES AND ILLEGAL IMMIGRATION-THE PERSPECTIVE OF SMUGGLING

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Abstract- This paper develops the role of economic incentives, particularly the relationship between employment opportunities and people smuggling, using data from the South West border in US from the period between 1980 and 2012. The estimation is controlled for variations between states and trends over time. The results suggest the potentially stronger effect of the wage on smuggling, while also indicating the negative relationship between unemployment rates and rates of smuggling in South West of the US. The present analysis partly supports the conclusions of Machin and Meghir (2000), treating the smuggling as crime.

Keywords- Aggregation, Employment Opportunities, People Smuggling, Crime, Ehrlich Model, Fixed-Effect JEL classification: K42; D12; C33

I. INTRODUCTION

Human immigration is still one of the most challenging and controversial topics in both economic and social studies. Many economic studies of immigration, such as Friedberg and Hunt (1995), Card (2001), and Borjas (2003), use a standard labor market model in which immigrant workers respond to differences in wages between countries. This paper treat the phenomenon in a different way, using an economic model of crime in order to identify what cause human smuggling based on labor market. Thus, this paper offers an adaptable regression model, based on the popular Ehrlich's model of crime, with which test influences on illegal immigration.

According to Ehrlich's simple theoretical economic model of crime (1973) an individual is willing to commit crime, comparing the total benefits and costs of being a 'criminal'. The main point of the Ehrlich model is that work and crime are treated as substitutes for each other. Machin and Meghir (2000) developed a structural model of crime probabilities. The main deviation from Ehrlich's model, therefore, is the idea that work and crime may coexist. The main contribution of this paper to research is the usage of smuggling as crime and also the insertion of the unemployment rate as an essential variable into the model. The economic model therefore consists of four predictions, varied according to the preferences of individuals.

II. ECONOMIC MODEL OF HUMAN SMUGGLING

An individual chooses the most favorable outcome by comparing the expected values of work and crime. If the market wage is lower than the potential revenue from crime, the choice will fall on crime. It is important to note that the assumption of uncertainty will not form part of the empirical model, which will focus solely on employment opportunities and macroeconomic variables, regardless of the likelihood of being caught.

- $EY^{m\phi} = [\alpha^{1m\phi} r_\gamma + \alpha^{2m\phi} \log(w) + \alpha^{3m\phi} \bar{c}_\gamma + area + time + \alpha^{om\phi}](1 + P_i) = x_i \alpha^{m\phi} + + v_i^m$
- $EY^{mo} = [\alpha^{1o\phi} \log(w_i) + area + time + \alpha_i^{oo\phi}] = x_i \alpha^{o\phi} + v_i^{o\phi}$
- $EY^{o\phi} = [\alpha^{1mo} r_\gamma + \alpha^{2mo} T_i + \alpha^{3mo} \bar{c}_\gamma + area + time + \alpha^{omo}](1 + P_i) = x_i \alpha^{mo} + v_i^{mo}$
- $EY^{oo} = [\alpha^{1oo} T_i + area + time + \alpha^{ooo}] x_i \alpha^{oo} + v_i^{oo}$

In these formulae, v symbolises the differences between individuals which may arise from the heterogeneity of their preferences and tastes relevant to each option.

The model assumes that an individual will choose whether to commit a crime –human smuggling- be considering its potential economic returns. The revenue from crime and from work are denoted by r_γ and w_i respectively. The revenue from unemployment is equivalent to that from unemployment benefit, denoted by T_i. The transfers T_i clearly constitutes an essential factor in the investigation of the relationship between employment opportunities and crime, because they represent effort-free earnings for the unemployed. The model suggests that if the relative size of α^{1mo} and α^{1oo} have a stronger effect on the likelihood of unemployment, and the cost of smuggling is low, the existence of unemployment benefit will tend to increase the smuggling rate, so in our model if this happening the human smuggling may increasing.

According to the first prediction, an increase in wages would imply a reduction in human smuggling, as it increases the incentive to work. If an individual earns more than the market wage, utility increases indirectly. Since work and crime move in parallel, the influence of wages is uncertain, as the decision to commit the crime is affected by the comparative value of criminal activity and legal activity. However, being a smuggler implies the sacrifice of effort as well as the necessary uncertainty caused by potential arrest. So, if wages increase, the revenue from crime

is lower than that from work, which means that the incentive to commit crime becomes less powerful than the incentive to work.

III. THE ECONOMETRIC MODEL

The following empirical forms, based on the structural model of Machin and Meghir (2000), will be utilized in order to determine which incentives cause people to be smugglers.

$$\begin{aligned} Smuggling_{it} &= a_i + \beta_i\, Wage_{it} \\ &+ \delta_i\, UnemplRate_{it} \\ &+ \zeta_i\, Transfer_{it} + \\ &\lambda_i\, Population_{it} + \varepsilon_{it} \end{aligned}$$

Wage is an explanatory variable that affect the dependent variable of smuggling, while unemployment rate, transfer and population are common independent variables which help to explain the relationship between wages and the smuggling. An increase in wages will tend to make the smuggling rate decrease, because the benefits of working will be higher than those of crime.

Most of the explanatory variables used in this study concern participation in the labor force, which means that multicollinearity is inevitable. For this reason, it is necessary to control the independent variables. Model illustrates the predictable need to control for the variables of unemployment benefits and population, which are strongly correlated with unemployment rate and per capita wage, respectively. Unemployment benefits generally tend to increase as unemployment rises. Thus, the net effect of unemployment benefits on smuggling rate will vanish because of the likely increase in unemployment. After the control of unemployment benefits the collinearity between unemployment rate and unemployment benefits is minimized. Likewise, if the average population is growing, the total amount of per capita wage will also increase. Therefore, although the unemployment rate and unemployment benefits, together with population and wages, are theoretically all valid variables which describe and explain criminal behavior, under empirical examination the effect of each individual variable is hard to determine.

To control for the variable of unemployment benefits, it is necessary to divide it by the unemployment rate. Similarly, the variable of population will be changed, to the amount of non-wages for the population of all individual states for the entire 33-year period from 1980 to 2012. Therefore, the revised structural empirical model[1] is as follows:

$$\begin{aligned} Smuggling_{it} &= a_i \\ &+ \beta_i\, PercapitaWage_{it} \\ &+ \delta_i\, UnemplRate_{it} \\ &+ \zeta_i \left(\frac{Transfer}{Unempl.\,Rat}\right)_{it} + \\ &\lambda_i \left(\frac{PersonIncome - Wage}{Population}\right)_{it} + \varepsilon_{it} \end{aligned}$$

IV. DATA SOURCE

The analysis uses data from the four states of the USA in the Southwest border in the 33-year period from 1980 to 2012, controlling for fixed and time effects. The data for illegal immigration in South West border was made available between 1980 and 2012 by the United States Border Patrol. A table of illegal immigration shows the total illegal alien apprehensions by fiscal year over this 33-year period. The aggregate level of wages across the four states of the USA for the period from 1980 to 2012 is described by the US Bureau of Economic Analysis (BEA). The BEA also records state-level unemployment benefits paid between 1980 and 2012.

The initial data for the unemployment rate is derived from the US Bureau of Labor Statistics between 1980 and 2012. The only demographic variable in the model, that of population, is derived from the total population by state collated by the Census Bureau of the United States covering the period from 1980 to 2012.

V. RESULTS - DISCUSSION

Table 1.a illustrates the results of the estimation of the wage specification, controlling for changes in demographic variables across four states on South West border, using a fixed-effect estimation. The results are also controlled for macroeconomic trends through the introduction of the time effect. Comparing the coefficients for the smuggling model and the theoretical crime model, the variable of per capita wage is statistical significant and the R-squares indicate that the 55.5% of the variation in the dependent variable of smuggling is explained by wage, unemployment benefits and population. However, unemployment rate has not strong effect suggesting that unemployed people is not willing to commit the crime of smuggling. There is a negative correlation between smuggling and per capita wage (-.965), which implies that a decrease in per capita wage will tend to increase the level of smuggling by 96.5%. In addition, there is a negative correlation between smuggling and unemployment benefits, suggesting that an increase in transfer will tend to decrease the smuggling by 55.1%.

Analyzing the labor market opportunities by state, Texas' labor market have a stronger correlation with smuggling, however the high standard errors for smuggling imply uncertain results. The

[1] The model is based on Ehrlich's economic model of crime.

unemployment benefits has stronger negative correlation with smuggling in New Mexico, implying that as the transfers in New Mexico increasing the people will not choose to commit crime.

Table 1. Applications of the smuggling model. Fixed-Effects Estimation for Smuggling, 1980-2012.

Independent Variables	Smuggling Overall	Smuggling Arizona	Smuggling California	Smuggling NewMexico	Smuggling Texas
Constant	21.153 (.605)	19.984 (1.224)	23.737 (1.500)	20.406 (1.052)	21.631 (1.634)
Per capita wage	-.965 (.404)	-.603 (.944)	-4.072 (1.278)	-.576 (1.2554)	-5.171 (1.159)
Unemployment Rate	-473 (.124)	-.601 (.218)	-.9317 (.243)	-.203 (.406)	-1.807 (.480)
Unemployment Benefits	-.551 (.090)	-.515 (.158)	-.388 (.193)	-.688 (.227)	.239 (.272)
Population	2.765 (.607)	2.280 (1.645)	8.804 (2.238)	2.376 (1.355)	6.984 (1.379)
R-sq:	0.5549	0.616	0.705	0.678	0.612
Observations	132	33	33	33	33

CONCLUSIONS

The present model predicts that rates of smuggling are higher in those specific locations and times where the relative wage has decreased, but this does not have robust verification. When the variable of unemployment is inserted into the empirical model, the unemployment rate seems to have weaker effect on smuggling rate, relative to wages.

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