



# Three Essays on Factor Mobility



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# Abstract

This dissertation consists of three essays on trade policy and factor mobility.

The first essay studies the effects of preferential tariff rates on China's imports from African Least Developed Countries (LDCs). On the second ministerial meeting of China-Africa Cooperation Forum (FOCAC) in 2003, China offered duty-free treatment to 190 products originating from a group of LDCs in Africa, so as to facilitate their entry into the Chinese market. The goal of this essay is to examine whether or not this agreement has some economic content. Based on detailed import data at the 6-digit harmonized system level, we employ a triple-difference (DDD) approach to empirically investigate the effects of preferential tariff rates on Chinese imports from African LDCs. The estimation results show that, on average, there is no evidence that duty free access helped African LDCs effectively gain access to the Chinese market in the years following the initial implementation of this policy. However, we do find that there is an increase of imports in the last year of our sample, suggesting that the impact is growing over time. We also find that agricultural goods experience the largest increase in import values, while imports of textile goods are still relative low.

The second essay investigates the impact on China's economic growth of the State-Sponsored Study Abroad Programmes (SSSAP). It is widely believed that human capital has played a crucial role in the Chinese economic miracle. In recent years, the Chinese government has launched a series of SSSAP as to further improve domestic human capital through foreign training. In this essay, we explore the effects of such programs on China's economic growth in a Lucas-type endogenous growth model with

human capital accumulation. We first derive the growth-maximizing tax rate on output which is used to finance public spending on education. Next, we determine the optimal share of educational expenditure between home-educated and foreign-educated human capital, taking tax rate on output as given. Due to the complexity of the model, we also carry out a series of numerical simulations to examine the effect of SSSAP on Chinese economic growth.

In the third essay, we study the European citizens' preferences concerning the allocation of power between European Union (EU) and Member States in the domain of immigration policy. We first develop a simple framework to show that (i) harmonization of immigration policies is likely to lead to a more liberal immigration policy; (ii) there exists a strong relationship between EU citizens' education levels and their supports for delegating competences to the EU institutions in the field of immigration. Using several rounds of Eurobarometer surveys carried out between 2000 and 2008, we test the theoretical predictions, and find that on average education level has a positive, statistically significant impact on natives' preferences over a common immigration policy. In addition, we find that self-reported political orientation and overall perception of the European Union also affect natives' attitudes towards the harmonization of immigration policy.

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# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>The Initial Impact of Preferential Access to China's Market under the Addis Ababa Action Plan</b>	<b>5</b>
2.1	Introduction . . . . .	5
2.2	Background . . . . .	7
2.3	Literature Review . . . . .	9
2.4	Empirical Strategy . . . . .	11
2.5	Data Description . . . . .	15
2.6	Estimation Results . . . . .	17
2.7	Conclusions . . . . .	21
<b>3</b>	<b>SSSAP and Economic Growth in China</b>	<b>41</b>
3.1	Introduction . . . . .	41
3.2	Background . . . . .	43
3.3	The Economy . . . . .	44
3.3.1	Production . . . . .	45
3.3.2	The household sector . . . . .	46
3.3.3	Production of human capital . . . . .	47
3.3.4	Government . . . . .	50
3.4	Balanced Growth Path . . . . .	51
3.5	Growth-Maximizing Policies . . . . .	52
3.5.1	Optimal tax rate . . . . .	52
3.5.2	Optimal allocation . . . . .	53

3.6 Numerical Simulation . . . . .	54
3.7 Conclusions . . . . .	57
<b>4 Individual Attitudes towards Europeanization of Immigration Policy</b>	<b>69</b>
4.1 Introduction . . . . .	69
4.2 Literature Review . . . . .	71
4.3 Theoretical Framework . . . . .	74
4.3.1 Centralization of immigration policy . . . . .	75
4.3.2 Individual attitudes towards centralization . . . . .	79
4.4 Data and Summary Statistics . . . . .	81
4.5 Benchmark Regression . . . . .	85
4.6 Robustness Checks . . . . .	87
4.7 Conclusions . . . . .	90

# List of Figures

2.1	Chinese average imports from African LDCs . . . . .	26
3.1	Recruitment of state sponsored study programme from 1996-2008 . . . . .	61
3.2	The distribution of scholarships across programmes in 2008 .	62
3.3	Growth rate against tax rate: fixed allocation of education expenditure . . . . .	63
3.4	Growth path of consumption to physical capital ratio . . . . .	64
3.5	Growth path of physical to foreign-educated capital ratio . .	65
3.6	Growth path of home-educated to foreign-educated capital ratio	66
3.7	Growth rate against allocation: fixed total education expenditure . . . . .	67
4.1	Relationship between human capital and changes in income .	96
4.2	Fraction of favoring an EU immigration policy over 2000-08 (EU-15) . . . . .	97
4.3	Fraction of favoring an EU immigration policy over 2004-08 (NMS-10) . . . . .	98
4.4	Individuals' attitudes to an EU immigration policy over time	99



# List of Tables

2.1	Summary Statistics . . . . .	27
2.2	DDD Estimate of Impact of Tariff-Free on Chinese Imports .	28
2.3	Estimation Results for the Benchmark Specification . . . . .	29
2.4	Timing of the Treatment Effect . . . . .	30
2.5	Treatment Effects across Sub-Categories . . . . .	31
4.1	Summary statistics of individual-level variables . . . . .	100
4.2	Summary statistics of individual-level variables by country (mean values) . . . . .	101
4.3	Determinants of Attitudes towards an EU Immigration Policy (EU-15) . . . . .	102
4.4	Determinants of Attitudes towards Common Immigration Pol- icy (EU15 + NMS10) . . . . .	103
4.5	Determinants of attitudes to common immi policy in each country (EU-15) . . . . .	104
4.6	Determinants of attitudes to common immi policy in each country (EU-15) continue . . . . .	105



# Chapter 1

## Introduction

This thesis contains three self-contained essays. The first essay explores the impact of preferential tariff rates on China's imports from African Least Developed Countries. The Second essay presents a simple endogenous growth model with two types of human capital to investigate China's State-Sponsored Study Abroad Programs. While the third essay offers a simple framework for individuals' attitudes towards the Europeanization of immigration policy and empirically examines the role played by education in shaping individuals' attitudes. In the remainder of this section, I will give a brief overview of the essays included in this thesis.

The first chapter, entitled "The Initial Impact of Preferential Access to China's Market under the Addis Ababa Action Plan", evaluates the effects of preferential tariff rates on China's imports from the Least Developed Countries (LDCs) in Africa. At the second ministerial meeting of the China-Africa Cooperation Forum (FOCAC) in 2003, the *Addis Ababa Action Plan* (2004-06) (hereafter AAAP) was concluded. One of the major concrete measures that China promised to undertake is granting tariff-free treatment for 190 products from 28 African LCDs who have developed diplomatic relations with China. Furthermore, in 2006, during the FOCAC Summit and the third Ministerial Conference, China extended zero-tariff treatment to more than 440 products from 30 African LDCs. Are these preferences merely a talking point for Chinese and African officials, or do they have

some economic content?

Based on detailed import data at the 6-digit harmonized system level, we employ a triple-difference (DDD) approach to empirically investigate the effects of preferential tariff rates on Chinese imports from African LDCs. The estimation results show that, on average, there is no evidence that duty free access helped African LDCs effectively gain access to the Chinese market in the years following the initial implementation of this policy. However, we do find that there is an increase of imports in the last year of our sample, suggesting that the impact is growing over time. We also find that agricultural goods experience the largest increase in import values, while imports of textile goods are still relative low. These results imply, on one hand, a longer period is required for firms in African LDCs to take advantage of the free access to Chinese markets; on the other hand, Chinese government should include more imports-sensitive products into the preference list to make the agreement effective.

The second chapter, entitled “SSSAP and Economic Growth in China”, investigates the impact of State-Sponsored Study Abroad Programmes (hereafter SSSAP) on Chinese economic growth. It is widely believed that human capital has played a crucial role in the Chinese economic miracle. In recent years, the Chinese government has launched a series of SSSAP as to further improve domestic human capital through foreign training. The SSSAP are designed to select and support high-level personnel to pursue higher education in foreign universities, mainly in Western developed countries. The recruitment numbers have been growing very rapidly, from 2044 students/scholars in 1996 to nearly 13,000 in 2008. Even if as of today the personnel enrolled in the programs account for only a small portion of the highly educated population in China, the effects of such programs are likely not to be negligible. Meanwhile, the SSSAP will have an impact on the investment in domestic higher education given the limited availability of fiscal funds for education. Therefore, what is the optimal allocation of investment among home- and foreign-educated human capital?

We investigate the SSSAP in a Lucas-type endogenous growth model

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with human capital accumulation. We find that the growth-maximizing tax rate on output, which is used to finance public spending on education, should be set to the elasticity of output with respect to human capital. We also find that the growth-maximizing allocation of educational expenditure is determined by the elasticity of final output with respect to human capital, the relative cost of foreign-educated human capital, as well as the elasticity of human capital output to government spending in education. In addition, we carry out a series of numerical simulations to examine the effects of SSSAP on Chinese economic performance.

The third paper, entitled “Individual Attitudes towards Europeanization of Immigration Policy”, explores the relationship between EU citizen’s education levels and their attitudes towards the Europeanization of immigration policy. Although the EU has been working to build a common immigration policy ever since the early 1990s, an EU common immigration policy does not exist yet. Member states are reluctant to delegate powers to supranational institutions, particularly concerning legal labor migration, by acting outside of the supranational organizations or by including provisions in the treaties. So, what lies at the heart of this kind of reluctance? Do government policies largely reflect the preferences of voters?

In this paper we study the European citizens’ preferences concerning the allocation of power between EU and member states in the domain of immigration policy. We first develop a simple framework to show that (i) harmonization of immigration policies is likely to lead to a more liberal immigration policy; (ii) there exists a strong relationship between natives’ education levels and their supports for delegating competences to EU institutions in the field of immigration. We then test the theoretical predictions, using several rounds of Eurobarometer surveys carried out between 2000 and 2008. We find that, on average, education level has a positive, statistically significant impact on individual’s preference over the centralization of immigration policy.



## Chapter 2

# The Initial Impact of Preferential Access to China's Market under the Addis Ababa Action Plan

### 2.1 Introduction

Over the last ten years, cooperation between China and African countries has received a lot of attention in the international media. In 2000, the China-Africa Cooperation Forum (FOCAC) was launched as a mechanism for collective dialogue and multilateral cooperation between China and a number of African countries, concentrating on issues of economic and social development. This forum marked a substantive change of emphasis in China's foreign policy toward Africa, from donor funding to economically viable and sustainable projects. The cooperation reached a new level in 2006 when the third ministerial meeting of FOCAC was held in Beijing. During that forum, the Chinese president Hu Jingtao announced the adoption of eight important measures to foster growth among the least developed countries (LDCs) of Africa, including the cancelation of \$US1.3 billion worth of foreign debt, the provision of loans on preferential terms, and the grant-

ing of duty-free market access for some of the commodities from the least developed countries in Africa.

Chinese statistics show that such tariff-free access is yielding remarkable results. In 2005, under the preferential arrangement, China imported products worth a total of US\$380 millions from Africa, up 88% on a year-on-year basis. In the first half of 2006, the value of such imports from Africa reached US\$250 million, a year-on-year growth of 57%. These numbers show that preferential access to the Chinese market might actually have played a positive role in promoting the growth of Africa's exports into China.

However, it may be too simplistic to attribute this surge in trade volumes entirely to the implementation of preferential access. The surge in imports of such products from LDCs in Africa might result from other factors, such as an overall boost in the exporter's economy, China's increasing demand and other related foreign trade policies. In fact, we do not expect large effects from this agreement since the preferential access offered by China to African LDCs is rather limited in terms of depth and coverage, compared to the preferences offered by developed countries to most African countries, which covers up to 95% of all the imported products. Furthermore, the overall share of African LDCs' exports going to China continues to be small, relative to the US and the EU, which also makes the impact of preferential access limited.

Therefore, a more precise analysis is required to examine the effect of this preferential arrangement on Chinese imports from African LDCs involved in the arrangement. We employ a triple-difference (or DDD) approach, to take advantage of the fact that the tariff-free policy is exclusively offered to 190 products from 28 African LDCs. With the triple difference specification, the effect of preferential access can be effectively isolated from the overall change for tariff-free products and overall change in countries evolved in the preferential agreement. The estimation results show that, on average, the preferential tariff rates do not have a strong impact on Chinese imports from LDCs in Africa.

The remainder of the paper is organized as follows. Section II provides

an overview of the evolution of Sino-African relations, and in particular of Chinese imports falling under the preferential arrangement. Section III reviews the relevant literature evaluating existing trade preferences offered to African countries. Section IV introduces the methodology of DDD estimation in detail. Section V describes the data whereas the results are presented in Section VI. Section VII concludes.

## 2.2 Background

Trade preferences for African countries have been granted, in various forms, by almost all developed countries, but with mixed results. The two most important preference schemes for African LDCs are the US African Growth and Opportunity Act (AGOA) and the EU Everything But Arms (EBA) Initiative. AGOA provides preferential access to over 6,400 products, and applies to 38 African countries, some of which are LDCs and some are not.<sup>1</sup> The EBA preference applies to all LDCs worldwide, covering 10,200 products. Just as suggested by its name, the EBA agreement provides zero-tariff for everything except armament. Only three products have not been liberalized immediately: bananas, rice and sugar, and their phase-in periods for full market access were January 2006, September 2009 and July 2009, respectively.<sup>2</sup>

Recently, some developing countries, such as China and India, have also joined this move to open their market for products from LDCs. The duty-free access to China's market for some commodities from African LDCs is an example of this type of policy. At the second ministerial meeting of the China-Africa Cooperation Forum (FOCAC), the *Addis Ababa Action Plan*

<sup>1</sup>As of 2000, when AGOA originally came into effect, the initiative applied only to 34 African countries. Since then, 8 countries have been added and 4 have been removed from Washington's eligibility list. The list of eligible products is also subject to changes at the US president's behest.

<sup>2</sup>The EBA is scarcely utilized by African LDCs. Primarily this is because qualifying countries prefer the more familiar, and in some respects superior, preferences provided by the long-standing Lomé Convention and the successor Cotonou agreement. The true test for EBA may occur in later years when it will become the only EU preference package available to some African LDCs.

(2004-06) (hereafter AAAP) was concluded. One of the major concrete measures that China promised to undertake is granting tariff-free treatment for 190 products from 28 African LCDs who have developed diplomatic relations with China. In January 2005, Beijing officially published the list of designated products and countries. Furthermore, in 2006, during the FOCAC Summit and the third Ministerial Conference, China extended zero-tariff treatment to more than 440 products from 30 African LDCs. The zero-tariff treatment of the newly-added 254 lines came into force on July 1st, 2007.

One factor making trade preferences potentially important is the rapidly increasing Chinese imports from African LDCs. As a destination country for African exports, China is still relatively small compared with the US and the EU. However, nine of the thirty countries which have received preferential treatment list China as the second biggest export destination. And five countries, i.e. Benin, Mali, Somalia, Sudan and Zambia indicate China as their most important export market. Only one country in the group – Chad – reports no trade with China yet. Using a simple “implicit transfer” calculation<sup>3</sup>, the overall economic value of these preferences is in the order of \$10.3 million per year.

Another factor which might increase the effectiveness of the preferences is that they are well tailored to the African LDCs' export capacity. The most economically valuable Chinese preferences involve primary products, including sesamum seeds, cocoa beans, various leathers, copper and cobalt minerals. The average margin of the original 190 tariff lines is 9.8%, and up to 10.9% in the case of the newly-added 254 lines, which means non-eligible China's MFN trade partners face an average MFN tariff rate of 9.8 or 10.9,

<sup>3</sup>The implicit transfer of tariff revenue due to the preference scheme is derived from the value of exports for which preference is actually requested (here, the average annual export value from 2002 to 2006) multiplied by the preference margin. In reality, this 'transfer' will not necessarily accrue to the exporter, but is only a crude approximation of the value of a preference. Furthermore, the true value will depend upon the price elasticity of demand and supply for these products in granting countries and beneficiaries. The implicit transfer is presented only to provide an indication for the true preference value.

whereas eligible African LDCs face zero.<sup>4</sup> This is a significant margin of preference, considering the benefiting countries already exported most of these products to China prior to special treatment.

Considering the remaining 49 products on the duty-free list currently not exported from African LDCs to China, these may provide additional economic benefits, if the margin of preference is significant and supply constraints are not too great. Most of such products are textiles, yarn and thread. These are potentially of great interest for African LDCs and represent higher value-added opportunities to export goods if these countries can cost-efficiently transform their silk, cotton and wool. The average margin of preference for these products is 9.4%, which does offer the African countries a real advantage over China's MFN trade partners.

However, there are still lots of important products which are excluded from these preferences. The most important omission is raw cotton (uncarried, uncombed), a vital export for many African LDCs, which faces a tariff as high as 40% in China. Products subject to import quotas, such as sugar and seeds oil, and products which are import sensitive, typically Aluminum oxide, are also excluded from the list. The extension of preferences in this area could lead to significant results, and these are the sectors in which China and African countries should work on in the future.

## 2.3 Literature Review

There is a substantial body of literature on measuring the effect of preferential market access granted to African LDCs and other African countries, but the conclusions reached vary substantially across different studies. The existing literature can broadly be divided into two branches, that is, ex-ante computable-general-equilibrium (CGE) simulation studies and ex-post empirical analyses. The ex-post empirical work is particularly extensive, drawing either on aggregate-level data or disaggregated commodity level

<sup>4</sup>By margin of preference we mean the percentage by which particular imports from one country are subject to lower tariff than the MFN rate; the higher the MFN tariff, the bigger the margin of preference.

data.

In particular, much empirical work has been devoted towards evaluating the trade and welfare effects of trade preferences for LDCs in Africa. One typical example is Hoekman *et al* (2002), which studies the potential effects of the removal of tariffs on peak items (with tariff above 15 percent) in the United States, Japan, Europe and Canada on exports from LDCs.<sup>5</sup> Using a simple partial equilibrium model of the world market for each 'product' - defined as a 6-digit tariff line item, the authors find that giving least developed countries full duty- and quota-free access to the US, EU, Canada and Japan for peak-tariff products, would increase their total annual exports by 11 percent - or roughly \$2.5 billion.

Frazer & Van Biesebroeck (2007) provides an in-depth examination of the impact of AGOA on US imports from African countries. Based on 6-digit level imports data, they find that AGOA has generated a large and robust impact on apparel imports into the United States, as well as on the agricultural and manufactured products covered by the agreement. They also find that these import responses grew over time and were particularly the largest in product categories where the tariffs removed were large. Furthermore, they find AGOA did not lead to a decrease in exports to Europe in these product categories, suggesting that the increase in AGOA exports is a result of trade creation rather than trade diversion.

A few researches have devoted their attention to the effects of liberalization among south countries. For example, Mayda & Steinberg (2008) explore the static effects of South-South preferential trade agreements stemming from changes in trade patterns. Specifically, they estimate the impact of the Common Market for Eastern and Southern Africa (COMESA) on Uganda's imports between 1994 and 2003, based on detailed import and tariff data at the 6-digit harmonized system level. Using a difference-in-difference estimation strategy, they find that, in contrast to evidence from aggregate statistics, COMESA's preferential tariff liberalization has not con-

<sup>5</sup>Such "tariff peaks" are often concentrated in products developing countries want to export: agricultural and food products and products from labor intensive sectors such as apparel and footwear.

siderably increased Uganda's trade with member countries.

However, so far the effects of the preferential access offered by China to African LDCs have not been the subject of close scrutiny. To the best of my knowledge, Minson (2007) is the only contribution on this topic. The author briefly examines the importance of the eligible 454 products for the African LDCs, and he concludes that it is very difficult to claim that the Chinese preference programme will have a dramatic impact in these economies. However, no precise estimation of the effect is provided in Minson (2007). In this paper, we try to fill this gap by performing a triple-difference estimation which is a widely-used measure in policy evaluation. From a methodological viewpoint, the analysis carried out in our paper is closely related to Frazer & Van Biesebroeck (2007).

## 2.4 Empirical Strategy

Any of the existing standard trade models predict that preferential tariff will induce eligible countries to increase their exports of eligible products which were already exporting, or start exporting eligible products which might become competitive because of the elimination of tariffs. Therefore, no formal model is presented in this paper.

The fact that unilateral tariff elimination is granted to a number of products from some African LDCs allows us to apply a triple difference identification strategy to estimate the effects on trade flows. The triple difference estimate, popular in evaluating policy changes, is an extension of the conventional difference-in-differences (DD) estimate. The DDD estimation controls for treatment-independent trends in a more robust way, and requires weaker assumptions than DD approach.

The intuition of DDD approach is straightforward, and can be best be seen when only two years are considered, one year prior to treatment, say 2004, and a second year when the treatment is in effect, say 2006. Let  $\ln IMP$  be the log of (one plus) imports values, with superscripts standing for treated or control group while subscripts indicating before or after the treatment. The triple difference used to measure the effect of the AAAP

tariff-free program is given by:

$$\begin{aligned}
 DDD = & \underbrace{((\ln IMP_{06}^T - \ln IMP_{04}^T) - (\ln IMP_{06}^C - \ln IMP_{04}^C))}_{\text{AAAPCountry-DD}} \\
 & - \underbrace{((\ln IMP_{06}^T - \ln IMP_{04}^T) - (\ln IMP_{06}^C - \ln IMP_{04}^C))}_{\text{Non-AAAPCountry-DD}} \quad (2.4.1)
 \end{aligned}$$

The first DD term gives the effect of tariff preferences on exports of eligible products within an designated country, by assuming that AAAP products and non-APPP products would experience a parallel export growth pattern in absence of policy intervention. And the second term gives the equivalent DD in non-designated country. Thus, the value of triple-difference isolates the “pure” effects of AAAP. Namely, the triple-difference estimation can identify whether AAAP disproportionately increases imports of eligible products from African LDCs compared to increases in imports of ineligible products from designated African LDCs, and also compared to the relative increases in imports of eligible to ineligible products from non-involved countries.

The simplest way of expressing the triple difference in equation (2.1) in regression form is to regress imports on three dummy variables: one for each difference ( $Ineffect_t$ ,  $Country_c$ , and  $Product_p$ ), as well as the three double interactions of these variables and the single triple interaction term.

$$\begin{aligned}
 \ln IMP_{cpt} = & \alpha_1 + \beta_1(Ineffect_t * Country_c * Product_p) + \\
 & \alpha_2(Ineffect_t * Product_p) + \\
 & \alpha_3(Ineffect_t * Country_c) + \\
 & \alpha_4(Country_c * Product_p) + \\
 & \alpha_5 Ineffect_t + \alpha_6 Country_c + \alpha_7 Product_p + \epsilon_{cpt} \quad (2.4.2)
 \end{aligned}$$

where  $p$  indexes a product,  $c$  indexes a country, and  $t$  indexes time. The left-hand side is the log of the value of imports into China of product  $p$  from country  $c$  at time  $t$ , as reported by China. The variable  $Ineffect_t$  is defined as a dummy switching from zero to one, for all countries and products, in

year 2005, when the preferential tariff rates came into force. The variable  $Country_c$  is a time-invariant dummy equal to one for those African LDCs and zero otherwise. Similarly,  $Product_p$  is a dichotomous variable taking the value of one for products eligible for duty-free import under the AAAP.

The specification above is the simplest but most restrictive one. It does not allow for much country- or product-level heterogeneity in the base-level of imports into China. All country-product combinations are lumped into four exclusive groups: eligible products from designated countries, ineligible products from designated countries, eligible products from non-involved countries, ineligible products from non-involved countries. Each group is restricted to have a single base level of imports. Additionally, it assumes that the increase in China's imports was the same for all eligible products and for all designated countries.

In order to relax these assumptions, Frazer & Van Biesebroeck (2007) in their paper employ an entirely unrestrictive specification:

$$\ln IMP_{cpt} = \beta_1 Ineffect_t * Country_c * Product_p \\ + country/product_{cp} + country/year_{ct} + product/year_{pt} \quad (2.4.3)$$

where, all the single dummies and double interaction terms are replaced with three sets of interactive fixed effects, which allow for heterogeneity in (i) the base level imports of a specific product from a specific country ( $country/product_{cp}$ ), (ii) the overall imports from a given country in a given year ( $country/year_{ct}$ ); (iii) the overall imports of a particular product in a given year ( $product/year_{pt}$ ). The only coefficient in this specification,  $\beta_1$ , measures the average treatment effect of tariff exemption of eligible products for designated countries over the years after implementation.

However, given the large number of products, creating and storing these interactive dummies requires computer memory space which is prohibitively high for many researchers. Therefore, we instead resort to a less unrestrictive

specification given by:

$$\begin{aligned}
 \ln IMP_{cpt} = & \beta_1(\text{Ineffect}_t * \text{Country}_c * \text{Product}_p) + \\
 & \alpha_2(\text{Ineffect}_t * \text{Product}_p) + \\
 & \alpha_3(\text{Ineffect}_t * \text{Country}_c) + \\
 & \text{country/product}_{cp} + \text{year}_t + \epsilon_{cpt}
 \end{aligned} \tag{2.4.4}$$

Our primary interest is still on the coefficient,  $\beta_1$ , of the triple interaction term,  $\text{Ineffect}_t * \text{Country}_c * \text{Product}_p$ , which estimates the impacts of trade liberalization under AAAP on imports from African LDCs into China. The double interaction term,  $\text{Ineffect}_t * \text{Product}_p$ , control for import variations of eligible products irrespective of their origins after the preferential arrangement is implemented, while the other double interaction term,  $\text{Ineffect}_t * \text{Country}_c$ , controls for variations in imports by China from designated LDCs in Africa, irrespective of their products, after the entry into force of the preferential arrangement. This specification allows for heterogeneity in the base level of imports of a specific product from a specific country, and also heterogeneity in those products in each period, due to a full set of product-country interactive dummies,  $\text{country/product}_{cp}$ , and a full set of year dummies,  $\text{year}_t$ .

An extension of the benchmark model is to consider different treatments for sub-category products. Let  $\Omega = \{A, M, T, O\}$  be the set of these categories, whose elements respectively represent agricultural products, mineral products, textiles goods and others. We use four product dummies,  $\text{Product}_{kj}(k \in \Omega)$ , to investigate the heterogenous treatments of eligible products. The modified specification is given by

$$\begin{aligned}
 \ln IMP_{cpt} = & \sum_{k \in \Omega} \beta_{1k}(\text{Ineffect}_t * \text{Country}_c * \text{Product}_{kp}) + \\
 & \sum_{k \in \Omega} \alpha_{2k}(\text{Ineffect}_t * \text{Product}_{kp}) + \\
 & \alpha_3(\text{Ineffect}_t * \text{Country}_c) + \\
 & \text{country/product}_{cp} + \text{year}_t + \epsilon_{cpt}
 \end{aligned} \tag{2.4.5}$$

where the coefficients,  $\beta_{1k}$ , capture the category-specific impact of elimination of tariff on China's imports from designated African LDCs.

Another variation on the benchmark specification is designed to distinguish the import response at the intensive margin - i.e. whether we observe increased exports, and at the extensive margin - whether a given sector is starting to export. It is very likely that the African LDCs start to export a range of products facing duty-free market access. But it is unlikely that these two effects are of the same magnitude, which is implicitly assumed in the benchmark specification. To deal with this concern, we use a linear probability model to isolate the extensive margin response, which is feasible since we also include the zero trade values.<sup>6</sup> The right-hand side of specification (2.4) remains unchanged, while the dependent variable is replaced by a binary variable that takes the value of one if the trade record is positive and zero otherwise.

## 2.5 Data Description

We use commodity-level import data reported by China at the 6-digit Harmonized System level (HS 2002), since some LDCs in Africa report trade data only sporadically. More precisely, import data are taken from the COMTRADE database developed by the United Nations Statistics Division.

Out of consideration for "similarity requirement between treated and control groups" in DDD estimation, we restrict our sample to developing countries except for Asian LDCs since they also enjoy free access into the Chinese market for the original 190 products since 2005.<sup>7</sup> For the same reason, we limit our sample to 4-digit level products which have underlying 6-digit level products involved in AAAP preferential tariff arrangement. For

<sup>6</sup>We choose linear probability model over probit model, because 1) the main disadvantage - predicted values are not restricted to lie on the (0, 1) interval - is unlikely to be much of an issue as all coefficients are identified off the time variation within country-product categories; 2) the probit model usually produce a biased estimates in DDD estimation, and the interactive term is difficult to be interpreted in DDD estimation.

<sup>7</sup>the definition of developing countries come from World Bank.

example, since the tariff of item, 010639, has been reduced to zero, the corresponding 4-digit category, 0106, is kept in the sample. On the opposite, if none of the 6-digit sub-categories has been involved in the preferential arrangement, the whole 4-digit category will be excluded from our sample. The number of the remaining sample is 244,081.

Due to data availability, we use the COMTRADE data and work at the HS 6-digit level of aggregation, even if the Act defines products benefitting from preferential treatment under AAAP at HS 8-digit level. Consequently, the  $Product_p$  variable in the regression is not a dummy, but varies continuously between 0 and 1. It is constructed to represent for each 6-digit product the fraction of underlying 8-digit products (by value) that are eligible for duty-free imports. However, we also constructed a binary variable which equals to one if there is at least one underlying 8-digit product is eligible for duty-free imports and zero otherwise, in order to get an overall view of the data set. This binary variable will not substantially bias our results since the item liberalized is exactly the main item or the unique item for which China has positive imports.

If nothing is reported in the original data set, imports are set to zero in our sample, assuming the missing values are randomly distributed across all observations. Based on this assumption, we follow a very simple procedure to deal with the zeros, i.e. adding one unit (dollar) to all import values before taking logarithms.<sup>8</sup> Thus, the dependent variable for most of the analysis is the log of one plus (value of) import of a particular product from each country in the developing world, except Asian LDCs, in each year from 2002 to 2007.

The full list of eligible products and designated countries is published on the website of the Ministry of Commerce.<sup>9</sup> Details of the products can be

<sup>8</sup>Frankel (1997) discusses several approaches that have been most commonly taken to deal with zero-valued entries (Frankel 1997, Chap. 6).

<sup>9</sup>The list is available at

<http://www.mofcom.gov.cn/aarticle/bb/200501/20050100335965.html>.

The 28 countries on the list are: Benin, Burundi, Cape Verde, Central African Republic, Comoros, Congo, Djibouti, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Mali, Mauritania, Mozambique, Niger, Rwanda, Sierra Leone, Sudan, Tanzania, Togo, Uganda and Zambia.

seen in Appendix I, including product descriptions and the corresponding preferential and Most Favored Nation (MFN) tariff rates at the 8-digit level. In an effort to capture different treatment effects for sub-category products, we divide the 190 eligible products into four sub-categories: agriculture, (Chap 1-24 under HS 2002, 40 products in total), minerals and base metals (Chap 72-83, 19 products), textiles (Chap 50-65, 38 products) and others (93 products).

There is another issue worth noting. The latest trade data accessible are for 2007, which prevents us from examining the long-term treatment effect. This short treatment window has the benefit of cleaner identification because few other changes can take place; however, on the other hand, it may bias the estimate since a longer period is required for firms to fully exploit the newly obtained market access.

Table 2.1 represents the summary statistics of the dependent and control variables included in the DDD estimation. Figure 2.1 gives Chinese average imports values for each of the four groups: eligible products in designated countries, non-eligible products in designated countries, eligible products in non-designated countries, and non-eligible products in non-designated countries. From Figure 2.1, we can see that Chinese imports of eligible products from designated Africa LDCs did not immediately surge in year 2005 when the free access came into force, but it kept growing in the following years after the implementation.

## 2.6 Estimation Results

After describing the model and the data used, we now turn to the estimation of the trade effects. First of all, we use Table 2.2 to illustrate the DDD estimation of the effect of elimination of tariff rates on Chinese imports from African LDCs. The top panel compares the change in imports for the eligible products to the change in imports for the non-eligible products in treatment countries. Each cell contains the average log of imports value for the group labeled on the axes, along with the standard error and the number of observations. There is a 11.1-percent increase in the import

value of eligible products over this period, compared to a 3.6-percent rise for non-eligible products. Thus, there is a 7.5-percent relative increase in the import values of products in countries which are granted a zero tariff rate.

The same exercise is performed for the control group, all the developing countries not involved in AAAP tariff-free preferences, in the bottom panel of Table 2.2. For this group, we find a 9.2-percent relative rise in import values. Taking the difference between the two panels of Table 2.2, we get the DDD estimate. Although not statistically significant, this negative DDD estimate roughly shows that the preferential tariff rates do not effectively help Africa LDCs export their products more to China.

The results for benchmark regression (2.4) with a full set of country-product and year fixed effects, estimated on the whole sample, are in column (1) of Table 2.3. The coefficient  $\beta_1$  on the triple-interaction term,  $Ineffect_t * Country_c * Product_p$ , identifies the impact of tariff elimination on China's imports of AAAP-eligible products from LDCs in Africa. The negative point estimate indicates that, on average, the Chinese imports from Africa LDCs marginally decreased (a fall of 0.6 percent) in the years following the implementation. This might be driven by the fact that the coverage of preferential tariff is quite limited, and the goods covered under the agreement are not the goods that African LDCs are capable of exporting. Furthermore, a longer period after the introduction of the agreement might be needed for firms to fully exploit the newly obtained market access.

For the purpose of comparison, the results for DD estimation are also presented in column (2) and (3) of Table 2.3. We find that the DDD approach address the "endogeneity of policy" critique of standard DD estimation if either a country or a products-level analysis was performed separately. In column (2), the sample is restricted to twenty-five LDCs in Africa who are involved in the AAAP framework. The coefficient on the double-interaction term,  $Ineffect_t * Product_p$ , captures the impact of concessions solely on the relative import growth of eligible and non-eligible products. We include additive country and year dummies, rather than double-interactive fixed ef-

fects as in the DDD specification, to allow for unobservable heterogeneities. In column (2), we find that there is a 9.1% relative rise in Chinese imports of eligible products from these twenty-five LDCs in Africa. The treatment effect is overestimated, and an DDD estimation suggests that such an increase could be driven by Chinese overall demand for these eligible products regardless of their origin.

The DD estimate can also be implemented by limiting the sample to the 190 products from all countries in the sample. In this way, the 25 African LDCs is the treated group, while the rest are considered as control group. Similarly, the coefficient on the double-interaction term,  $Ineffect_t * Country_c$ , represents the difference between the export growth on these products in African LDCs and other developing countries. The effect in column (3) is underestimated at -6.5%, since the estimate fails to take into account the overall drop in China's imports from designated African LDC countries compared to other countries, for all products, or for all non-eligible products more precisely.

And in column (4), we report the estimate of the effects of free market access on the probability that an eligible country exports a product to China. The estimate shows that such probability on average has slightly decreased by 0.4%, during the period 2005-2007. Under the preferential arrangement, it is possible for designated countries to increase the volume of products they already exported, however, it is more difficult for them to create new exports in a short time.

The results of Table 2.3 are the average treatment effects for all the eligible products and countries in all the years following the implementation of the agreement. We can examine the timing of the effect by interacting the triple interaction term with year dummies for each of the post-treatment years. As in the benchmark specification, a full set of country-product interactive dummies and year dummies are included as controls. Both the effects on trade values and probability of starting to export are reported in Table 2.4.

The results in column (1) of Table 2.4 show that the impact of free

access grows over time, but until 2007 it did not play a role in encouraging Chinese imports of eligible products from African LDCs. We expect the preferential arrangement to have a larger impact in the following years as more and more firms get familiar with and take advantage of the free access to Chinese markets. We do not find an evidence that tariff-free agreement helped African LDCs starting export new products whose export values are zero prior to the introduction of the agreement. However, we observe that the negative coefficient becomes much smaller in year 2007, suggesting the preferential tariff might have a positive effect on probability of exporting in the near future.

To this point, we have implicitly assumed that the impact of the tariff elimination is the same across all eligible products. In reality, they might differ from each other since they will be affected by different demand- and supply-side factors. Allowing heterogeneous treatment effects for these sub-categories simply requires replacing the dummy variable,  $Product_p$ , with four dummies,  $Product_{kj}(k \in \Omega)$ , where  $\Omega$  is the set of four products sub-category. As in the benchmark specification, a full set of country/year interactive fixed effects, as well as year fixed effects, are included in this modified specification.

The estimation results of specification (2.5) are reported in Table 2.5, which presents the different effects of trade liberalization on sub-categories of products under the zero-tariff agreement. Results in column (1) show that there is a 15.8-percent relative fall in textiles goods, which is not surprising since the African LDCs do not have a comparative advantage in textiles goods. On the other hand, the agricultural products experience a 14.2-percent relative increase. For mineral products and all other products, we only see a marginal relative rise, 2.2-percent and 1.7-percent, respectively.

Compared to the impact on trade values, the effect on the probability of exporting new products is relatively small, as shown in column (2) of Table 2.5. There is a relative rise, 0.98-percent and 0.6-percent, respectively for agricultural and mineral goods. On the other hand, a relative decrease, 1.7-percent and 0.4-percent, is observed respectively in the probability of

importing textiles and other goods. These results are consistent with the general pattern of Chinese imports.

In sum, we find that the preferential tariff rates under the AAAP framework neither substantially increase China's imports of eligible products from African LDCs, except in year 2007, nor they increase the probability of importing. In terms of products sub-category, we find that agricultural goods enjoy the largest gains from free access to Chinese market, whereas imports of textile goods remain relatively low.

## 2.7 Conclusions

This paper has carried out what is – to the best of our knowledge – the first systematic analysis of the impact of the Addis Ababa Action Plan on China's imports from African LDC countries. As a result of the AAAP, 190 products have gained duty free access in China in 2005, whereas the same status has been reached by a total of 454 products three years later.

Our analysis has focused on the original 190 items because of the lack of more recent trade data. To isolate the treatment effect directly tied to the preferences from export growth in non-eligible products or in non-designated countries, we have implemented a triple-difference (DDD) approach. The DDD approach can effectively address the “endogeneity of policy” problem in standard DD method, and correct the biases in the DD estimates which would result from focusing only on eligible products or only in designated countries.

The estimation result of the benchmark model shows that there is no evidence that the elimination of tariff has a strong, positive effect on exports of eligible products from designated African LDCs into China and on the probability of starting export new products. More specifically, there is a relative fall, by 0.6-percent and 0.4-percent, respectively, for absolute trade values and probability of exporting new products.

In the benchmark specification of DDD estimate, it is implicitly assumed that the treatment effect is the same cross all eligible products over the years following its implementation. We relax this assumption, by checking

the effects over time and cross sub-categories. We did not find a positive impact neither on absolute trade value nor on the probability of exporting in year 2005 and 2006. However, in year 2007, there is a relative increase, by 3.2-percent, in Chinese imports of eligible products from eligible African LDCs. As for the effects cross sub-categories, we found relative rises for all the products except for textile goods.

It is worth mentioning that there are still many products that are excluded from these preferences. The most important omission is raw cotton (uncarded, uncombed), a vital export for many African LDCs, which faces a 40% tariff in China. However, it is unlikely to be included in the preference in very near term. Realistically, China is much more likely to offer preferences on products less sensitive than cotton, for example products with an MFN tariff below 20%. The inclusion of such kind of products will effectively promote China's imports from African LDCs.

As a final point, another issue deserving consideration is China has made a vast investment on road, rail networks and some other sectors on the continent, with billions of dollars committed to finance these projects. If the massive project finance would succeed, the value of Chinese trade preferences - indeed, the value of all trade preferences for these African countries - could multiply with time. And it would be interesting to explore the overall effect of the Sino-African cooperation, including technical assistance and investment in infrastructure, on the economic growth of African LDCs in the near future.

# References

- [1] Anderson J. E. and E. V. Wincoop (2003). Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review* 93, 170-192.
- [2] Besley T. and A. Case (2000). Unnatural Experiments? Estimating the Incidence of Endogenous Policies. *Economic Journal* 110, 672-694.
- [3] Brenton P. and T. Ikezuki (2004). The Initial and Potential Impact of Preferential Access to the U.S. Market under the African Growth and Opportunity Act. World Bank Policy Research Working Paper 3262.
- [4] Brenton P. (2003). Integrating the Least Developed Countries into the World Trade System: The Current Impact of EU Preferences under Everything But Arms. World Bank Policy Research Working Paper 3018.
- [5] Bertrand M., E. Duflo, and S. Mullainathan (2004). How Much Should We Trust Differences-in-Differences Estimates? *Quarterly Journal of Economics* 119, 249-275.
- [6] Broadman H. G. (2006). Africa's Silk Road: China and India's New Economic Frontier. The World Bank.
- [7] Collier P. and J. W. Gunning (1999). Explaining African Economic Performance. *Journal of Economic Literature* 37, 64-111.
- [8] Frankel J. A. (1997). A Regional Trading Blocs: In the World Economic System. Washington, DC: Institute of International Economics.

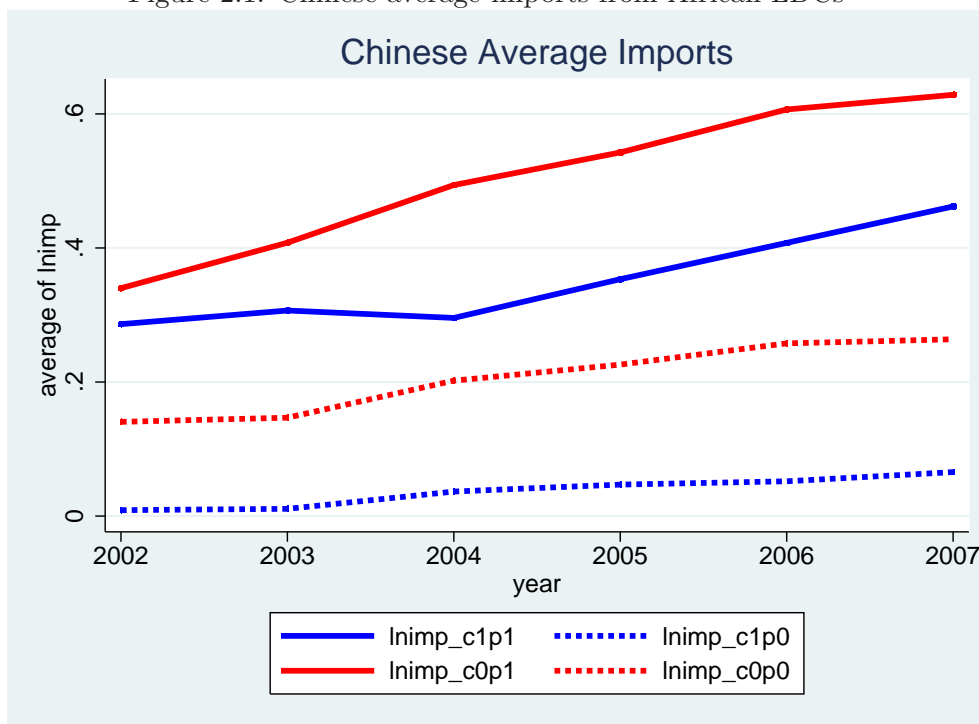
- [9] Frankel J. A., E. Stein and S. Wei (1995). Trading Blocs and the Americas: The Natural, the Unnatural, and the Supper-Natural. *Journal of Development Economics* 47, 61-95.
- [10] Frazer G. and J. V. Biesebroek (2007). Trade Growth under the African Growth and Opportunity Act. *The Review of Economics and Statistics* 92, 128-144.
- [11] Gibbon P. (2003). The African Growth and Opportunity at and the Global Commodity Chain for Clothing. *World Development* 31, 1809-1827.
- [12] Gill B., C.H. Huang, and J. S. Morrison (2007). Assessing China's Growing Influence in Africa. *China Security* 3, 3-21.
- [13] Gruber J. (1994). The Incidence of Mandated Maternity Benefits. *The American Economic Review* 84, 622-641.
- [14] Hoekman B., Ng. Francis and M. Olarreaga (2002). Eliminating Excessive Tariffs on Exports of Least Developed Countries. *World Bank Economic Review*, 1-21.
- [15] Limao N. and A. J. Venables (2001). Infrastructure, Geographic Disadvantage, Transport Costs and Trade. *World Bank Economic Review* 15, 451-479.
- [16] Meyer B. D. (1994). Natural and Quasi-Experiments in Economics. Technical Working Paper No. 170, National Bureau of Economic Research
- [17] Mayda A. M. and C. Steinberg (2008). Do South-South Trade Agreements Increase Trade? Commodity-Level Evidence from COMESA. *Canadian Journal of Economics, Canadian Economics Association*, 42, 1361-1389.
- [18] Martyn A., S. Thorsten and R. Upward (2006). Practical Fixed-Effects Estimation Methods for the Three-Way Error-Components Model. *The Stata Journal* 6, 461-181.

## REFERENCES

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- [19] Minson A. (2007). Will Chinese Trade Preferences Aid African LDCs? Briefing published by The South African Institute for International Affairs.
- [20] Wang J. (2007). What Drives China's Growing Role in Africa? International Monetary Fund Working Paper 07/211.
- [21] Wang Z. and A. Winters (1998). Africa's Role in Multilateral Trade Negotiations: Past and Future. *Journal of African Economics*, 1-33.

Figure 2.1: Chinese average imports from African LDCs



Note:  $\ln imp_{c1p1}$  is China's average imports of eligible products from treated countries; whereas  $\ln imp_{c1p0}$  is the average imports of non-eligible products from treated countries; the other two variables are defined in a similar way, which represents the average imports of eligible and non-eligible products from countries in control group.

Table 2.1: Summary Statistics

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>No. of Obs.</b>
year	2004.5	1.708	2002	2007	244081
imp	37357.246	2297976.233	0	455000000	244081
lnimp	0.228	1.519	0	19.936	244081
dimp	0.025	0.157	0	1	244081
dp	0.248	0.423	0	1	244081
dc	0.347	0.476	0	1	244081
dt	0.5	0.5	0	1	244081
DD	0.124	0.324	0	1	244081
ct	0.174	0.379	0	1	244081
cp	0.086	0.276	0	1	244081
DDD	0.043	0.2	0	1	244081
dpcodea	0.044	0.2	0	1	244081
dpcodem	0.028	0.164	0	1	244081
dpcodet	0.056	0.228	0	1	244081
dpcodeo	0.12	0.319	0	1	244081

Table 2.2: DDD Estimate of Impact of Tariff-Free on Chinese Imports

Product/year	Pre-AAAP Periods	After-AAAP Periods	Time Difference
<i>A. Treatment country</i>			
eligible products	0.2963 (1.7433) [11250]	0.4077 (2.1511) [11250]	0.1114 (0.0261)
Non-eligible products	0.0187 (0.4200) [31125]	0.0548 (0.7103) [31125]	0.0361 (0.0047)
product difference:	0.2776 (0.0106)	0.3528 (0.0139)	
Difference-in- difference:	0.0753 (0.0175)		
<i>B. Control countries</i>			
eligible products	0.4139 (2.038) [21150]	0.5926 (2.4713) [21150]	0.1787 (0.0220)
Non-eligible products	0.1632 (1.2556) [58515]	0.2491 (1.5458) [58515]	0.0860 (0.0082)
product difference:	0.2508 (0.0121)	0.3434 (0.0147)	
Difference-in- difference:	0.0927 (0.0190)		
<b>DDD:</b>	<b>-0.0174</b> <b>(0.291)</b>		

Notes: Cells contain mean log of imports values for the group identified. Standard errors are reported in parentheses; sample size are given in square brackets. Years before/after tariff change, and treated/control products/countries, are defined in the text.

DDD is the difference-in-difference from the upper panel minus that in the lower panel.

Table 2.3: Estimation Results for the Benchmark Specification

Dependent Variable	<i>lnIMP</i>	<i>lnIMP</i>	<i>lnIMP</i>	Dimport
Sample	full	Africa LDCs	eligible products	full
Method	triple-diffs	diff-in-diffs	diff-in-diffs	triple-diffs
	(1)	(2)	(3)	(4)
Marginal Effects	-0.6 %	9.1%	-6.5%	-0.4%
Ineffect*Ctry*Prod	-0.00573 (0.0184)			-0.00368* (0.00217)
Ineffect*Prod		0.0869** (0.0183)		
Ineffect*Ctry			-0.0672* (0.0357)	
Country/product FEs	yes	no	no	yes
Year FEs	yes	yes	yes	yes
Observations	244080	84750	64800	244080
Number of FEs	40684	5	5	40684

Notes: Robust t statistics are given in parentheses; \* significant at 5%, \*\* significant at 1%.

Controls in columns (1) and (4) include country-product interactive dummies and year dummies.

Controls in column (2) includes additive country and year dummies.

Controls in column (3) includes additive product and year dummies.

Marginal effects are calculated as  $(exp(\hat{\beta}) - 1)$ .

Table 2.4: Timing of the Treatment Effect

Dependent Variable	$\ln IMP$	import dummy
Sample	full	full
Method	triple-diffs	triple-diffs
	(1)	(2)
Marginal Effects		
2005(t*)	-3.8%	-0.5%
2006(t*+1)	-1.0%	-0.5 %
2007(t*+2)	3.2%	-0.07%
Ineffect*Ctry*Prod		
2005(t*)	-0.0389 (-1.71)	-0.00520 (-1.93)
2006(t*+1)	-0.0102 (-0.45)	-0.00518 (-1.93)
2007(t*+2)	0.0319 (1.40)	-0.000662 (-0.25)
Fixed Effects		
	country/product	country/product
	year	year
Observations	244080	244080
Number of FEs	40684	40684

Notes: Robust t statistics are given in parentheses; \* significant at 5%, \*\* significant at 1%.

Controls in column (1) and (2) include a full set of country-product interactive dummies and year dummies.

Marginal effects are calculated as  $\exp(\hat{\beta}) - 1$ .

Table 2.5: Treatment Effects across Sub-Categories

Dependent Variable	$\ln IMP$	import dummy
Sample	full	full
Method	triple-diffs	triple-diffs
	(1)	(2)
Marginal Effects		
Agriculture	14.2%	0.98%
Minerals	2.2%	0.6%
Textiles	-15.8%	-1.7%
Others	1.7%	-0.4%
Ineffect*Ctry*Prod		
Agriculture	0.133*** (3.39)	0.00979** (2.12)
Minerals	0.0216 (0.45)	0.00611 (1.08)
Textiles	-0.172*** (-5.01)	-0.0174*** (-4.27)
Others	0.0169 (0.68)	-0.00399 (-1.37)
Fixed Effects		
	country/product	country/product
	year	year
Observations	244080	244080
Number of FEs	40684	40684

Notes: Robust t statistics are given in parentheses; \* significant at 5%, \*\* significant at 1%.

Controls in both columns include a full set of country-product interactive dummies, and year dummies.

Marginal effects are calculated as  $\exp(\hat{\beta}) - 1$ .

## Appendix

Products Qualifying for Chinese Preferences to African LDCs  
(by HS 8-digit code)

No.	HS tariff Code	Description	Margin of Preference
1	01063990	Birds, nes	10
2	01069090	Other live animals, not edible	10
3	03033300	Frozen sole	12
4	03033900	Frozen flat fish (excl. halibut, plaice & sole)	10
5	03035000	Frozen herrings (excl. livers & roes)	10
6	03037100	Frozen sardines, brisling or sprats	12
7	03037910	Frozen scabber fish (trichurius)	10
8	03037990	Frozen fish, nes	10
9	03038000	Frozen fish livers & roes	10
10	03049000	Frozen fish meat (excl. fillets)	10
11	03055920	Dried sharks' fins, not smoked	15
12	03055990	Other dried fish, not smoked	16
13	03061319	Frozen shrimps in shell	5
14	03061329	Frozen prawns in shell	5
15	03061490	Other frozen crabs, nes	10
16	03074900	Cuttle fish & squid, frozen, dried, salted or in brine	12
17	03075900	Octopus, frozen, dried, salted or in brine	17
18	03079920	Sea cucumbers, frozen, dried, salted or in brine	10
19	05071000	Ivory, its powder & waste, unworked	10
20	05080090	Coral; shells of molluscs, crustaceans, etc, not cut to shape	12
21	05119111	Fertilized fish eggs	12
22	05119119	Other products of fish	12
23	05119190	Products of crustaceans, molluscs or other aquatic invertebrates; dead animals of chapter 3	12
24	06049900	Parts of plants, without flowers or buds	10
25	08013100	Cashew nuts, in shell, fresh or dried	20
26	09011100	Coffee, not roasted or decaffeinated	8

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
27	09011200	Decaffeinated coffee, not roasted	8
28	09050000	Vanilla	15
29	09070000	Cloves (whole fruit, cloves & stems)	3
30	12074090	Sesamum seeds excl for sowing	10
31	12119050	Plants and parts of plants, used in perfumery	8
32	12122090	Edible seaweeds and other algae, fresh chilled frozen or dried nes	15
33	13012000	Gum arabic	15
34	13019020	Olibanum, myrrh and dragon's blood	3
35	14019090	Other vegetable plaiting materials, nes	10
36	14049000	Vegetable products, nes	15
37	15131900	Coconut copra oil (excl. crude) & fractions thereof	9.5
38	16041990	Prepared or preserved fish (excl. minced), nes	12
39	18010000	Cocoa beans, whole or broken, raw or roasted	8
40	18040000	Cocoa butter, fat & oil	22
41	20041000	Potatoes, preserved other than by vinegar or acetic acid, frozen	13
42	25061000	Quartz	3
43	25062100	Crude or roughly trimmed quartzite	3
44	25062900	Quartzite cut into blocks or slabs of a rectangular shape	3
45	25084000	Other clays, nes, whether or not calcined	3
46	25085000	Andalusite, kyanite & sillimanite, whether or not calcined	3
47	25140000	Slate, whether or not roughly trimmed or cut into blocks or slabs of a rectangular (incl. square) shape	3
48	25151100	Marble & travertine crude or roughly trimmed	4
49	25161100	Granite, crude or roughly trimmed	4
50	25162100	Sandstone, crude or roughly trimmed	3
51	25171000	Pebbles, gravel, broken or crushed stone, commonly used for concrete aggregates, for road metalling or for railway or other ballast, shingle & flint, whether or not heat-treated	4
52	25174900	Granules, chippings & powder, of stones(excl. marble) of heading 25.15 & 25.16, whether or not heat-treated	3
53	25309091	Wollastonite	3
54	25309099	Mineral substances, nes	3
55	26203000	Ash & residues containing mainly copper & compound thereof	4
56	27101991	Lubricating oils	6

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
57	27141000	Bituminous or oil shale & tar sands	6
58	29071990	Monophenols and their salts, nes	5.5
59	29095000	Ether-phenols, ether-alcohol-phenols and their halogenatd, sulphonated, nitrated or nitrosated derivatives	5.5
60	29157090	Palmitic acid, its salts and esters; salts and esters of stearic acid	5.5
61	29392100	Quinine and its salts	4
62	33011300	Essential oils of lemon (incl. concretes & absolutes)	20
63	33012990	Essential oils other than of citrus fruit	15
64	33019090	Concentrates of essential oils in fats,in fixed oils , in waxes; terpenic by-products of the deterpenation of essential oils; aqueous distillates & aqueous solutions of essential oils	20
65	33029000	Odoriferous substances used as raw materials in other industry	10
66	34031900	Lubricating preparations, containing petroleum oils or oils obtained from bituminous minerals and their weight <70%	10
67	39152000	Waste, parings & scrap, of polymers of styrene	9.7
68	39159010	Waste, parings & scrap, of diglycol terephthalate of styrene	9.7
69	39159090	Waste, parings & scrap, of other plastics, nes	9.7
70	39191099	Self-adhesive tape, plates, strip, sheet , film , foil & other flat shapes, of plastics, in rolls, width≤20cm,nes	6.5
71	39219090	Other plates, strips, sheet, film of plastics, nes	6.5
72	39229000	Bidets, lavatory pans & other sanitary ware of plastics, nes	10
73	39269010	Machine or instruments parts of plastics	10
74	39269090	Articles of plastics, nes	10
75	40111000	New pneumatic tyres, of rubber of a kind used on motor cars	10
76	40169310	Gaskets, washers/seals of vulcanized rubber for machines	8
77	41041111	Chrome-tanned bovine leather (wet blue skin leather), full grains, unsplit, or grain splits, not further prepared	7
78	41041911	Wet blue bovine leather, not further prepared, nes	7
79	41051010	Wet-blue sheep or lamb skin leather, without wool on, but not further prepared, whether or not split	14
80	41051090	Sheep or lamb skin leather, in the wet state other than wet-blue, without wool on, but not further prepared, whether or not split	10

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
81	41053000	Sheep or lamb skin leather, in the dry state(crust), without wool on, but not further prepared, whether or not split	8
82	41062100	Goat or kid skin leather, in the wet state(incl. wet-blue), without hair on, but not further prepared, whether or not split	14
83	41064000	Leather of reptiles, tanned or crust, without hair on, but not further prepared, whether or not split	14
84	41079200	Leather further prepared after tanning or crusting, including parchment-dressed leather, of bovine (including buffalo) or equine animals, without hair on, whether or not split	5
85	41120000	Leather further prepared after tanning or crusting, parchment-dressed leather, of sheep or lamb, without wool on, whether or not split, other than leather of heading	8
86	41131000	Leather further prepared after tanning or crusting, including parchment-dressed leather, of goats or kids, without wool or hair on, whether or not split	14
87	41133000	Leather further prepared after tanning or crusting, including parchment-dressed leather, of reptiles, without wool or hair on, whether or not split, other than leather of heading 41.14	14
88	42022200	Handbags, whether or not with shoulder strap, incl. those without handle, with outer surface of plastic sheeting or of textile materials	10
89	42023100	Articles of a kind normally carried in the pocket or handbag, with outer surface of leather, of composition or patent leather	10
90	42023200	Articles of a kind normally carried in the pocket or handbag, with outer surface of plastic sheeting or of textile materials	20
91	42029200	Tool bags, cutlery cases and containers nes, with outer surface of plastic sheeting or of textile materials	10
92	44201010	Wood or bamboo carvings	0
93	44201090	Statuettes and other ornaments, of wood, nes	0
94	44209090	Caskets and cases for jewellery or cutlery, and similar articles, of wood; wooden articles or furniture not falling in Chapter 94	0
95	46012029	Mats, matting and screens of grass or straw (other than rushes)	9

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
96	46019199	Plaits materials, plaits and similar products of plaiting materials, bond together in parallel strands or woven, in sheet form, whether or not being finished articles, of other vegetable plaiting material, nes	9
97	46021020	Basketwork, wickerwork and other articles, of grass or straw	9
98	49100000	Calendars of any kind, printed, including calendar blocks	7.5
99	51081000	Carded yarn of fine animal hair, not put up for retail sale	5
100	52052100	Combed single cotton yarn, with $\geq 85\%$ cotton, nprs $\leq 14$ mn	5
101	52053200	Uncombed cabled cotton yarn, with $\geq 85\%$ cotton, nprs $> 14$ mn but $\leq 43$ mn	5
102	52054200	Combed cabled cotton yarn, with $\geq 85\%$ cotton, nprs $> 14$ mn but $\leq 43$ mn	5
103	52083200	Dyed plain cotton weave, with $\geq 85\%$ cotton, $> 100$ g/m <sup>2</sup> , $\leq 200$ g/m <sup>2</sup>	10
104	52085200	Printed plain cotton weave, with $\geq 85\%$ cotton, $> 100$ g/m <sup>2</sup> , $\leq 200$ g/m <sup>2</sup>	10
105	52091100	Unbleached plain cotton weave, with $\geq 85\%$ cotton, $> 200$ g/m <sup>2</sup>	10
106	52105900	Printed woven cotton fabrics, nes, with $< 85\%$ cotton, $\leq 200$ g/m <sup>2</sup>	10
107	53041000	Sisal & other textile fibres of the genus Agave, raw	5
108	53049000	Sisal, etc (excl. raw), not spun; tow & waste of these fibres	5
109	53082000	True hemp yarn	6
110	54076100	Other woven fabrics of synthetic yarn, $\geq 85\%$ non-textured polyester	10
111	54079200	Dyed woven fabrics of synthetic filament yarn, nes	10
112	55081000	Sewing thread of synthetic staple fibres	5
113	58012200	Cut corduroy of cotton	10
114	58071000	Labels, badges and similar articles of textiles, woven, in piece, in strips or cut to shape or size, not embriodered	10
115	61033200	Men's or boys' jackets & blazers of cotton, knitted or crocheted	16
116	61043200	Women's or girls' jackets, of cotton, knitted or crocheted	16
117	61061000	Women's or girls' blouses, etc, of cotton, knitted or crocheted	16
118	61091000	T-shirts, singlets & other vests, of cotton, knitted or crocheted	14
119	61099090	T-shirts, singlets, etc, of other textiles, nes, knitted/crocheted	14
120	61101100	Jerseys, pullovers, etc, of wool, knitted or crocheted	14

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
121	61102000	Jerseys, pullovers, etc, of cotton, knitted or crocheted	14
122	61178000	Other clothing accessories, knitted or crocheted, nes	14
123	62031100	Men's or boys' suits of wool or fine animal hair	17.5
124	62033200	Men's or boys' jackets & blazers of cotton	16
125	62033300	Men's or boys' jackets & blazers of synthetic fibres	17.5
126	62033900	Men's or boys' jackets & blazers of other textl materials, nes	16
127	62034900	Men's or boys' trousers, breeches, nes, of oth textile fibres	16
128	62043100	Women's or girls' jackets & blazers of wool or fine animal hair	16
129	62045900	Women's or girls' skirts of other textile materials, nes	14
130	62046200	Women's or girls' trousers, breeches, etc, of cotton	16
131	62052000	Men's or boys' shirts of cotton	16
132	62053000	Men's or boys' shirts of man-made fibres	16
133	62069000	Women's or girls' blouses, shirts, etc, of other textiles, nes	16
134	62079100	Men's or boys' singlets, dressing gowns, etc, of cotton	14
135	62159000	Ties, bow ties & cravats of other textiles, nes	14
136	62179000	Parts of garments or of clothing accessories, nes	14
137	68021010	Tiles etc of marble, side < 7cm; artificial colored granuls,powder	24
138	68029990	Worked building stone and articles thereof, nes	24
139	68159900	Articles of stone or of other mineral substances nes	17.5
140	71023100	Diamonds non-industrial unworked or simply sawn, cleaved or bruted	3
141	71031000	Precious or semi-precious stones (other than diamonds), unworked or simply sawn or rough shaped	3
142	71049099	Synthetic/reconstructed precious/semi-precious stones, further worked, not for technical use	8
143	71162000	Articles of precious or semi-precious stones (natural,synthectic or reconstructed)	35
144	71171900	Imitation jewellery nes of base metal	17
145	72022900	Ferro-silicon, nes	2
146	73089000	Structure/parts nes, plate,rods etc prepared for use in structures,of iron/steel	4
147	73181500	Bolts and screws nes, whether or not with their nuts or washers,of iron/steel	8

REFERENCES

No.	HS tariff Code	Description	Margin of Preference
148	74011000	Cu mattes	2
149	74020000	Cu unrefined, Cu anodes for electrolytic refining	2
150	74031100	Cu cathodes & sections of cathodes unwrought	2
151	74040000	Waste & scrap, Cu/Cu alloy	1.5
152	74199990	Articles of Cu, nes, not for technical use	20
153	75022000	Ni unwrought, alloyed	3
154	76011000	Al unwrought, not alloyed	5
155	76020000	Waste & scrap, Al	1.5
156	81052000	Cobalt,unwrought,intermediate products,powders	4
157	81059000	Cobalt wrought & articles thereof	8
158	83024900	Mountings, fittings & similar articles of base metal, nes	12
159	83081000	Hooks,eyes & eyelets of base metal	10.5
160	83089000	Claps,buckles & like, beads & spangles of base metal	10.5
161	84139100	Parts of pumps for liquids	5
162	84314310	Parts of oil/gas boring machinery	4
163	84339090	Parts of other machines of heading 84.33	3
164	84701000	Electronic calculators, operating without external source of power operating without external source of power	0
165	84821000	Bearings, ball	8
166	84829900	Bearing parts, nes	6
167	84831090	Transmission shafts not for ships; cranks	6
168	84834090	Gears/gearing,ball screws,gear boxes,speed changers, etc	8
169	84839000	Parts of applanced of heading No. 84.83	8
170	84849000	Gasket sets consisting of gaskets of different materials	8
171	85011099	Electric motors of an output $\leq 37.5$ W, nes	9
172	85021100	Generating sets,diesel or semi-diesel engines, output $\leq 75$ KVA	10
173	85139010	Parts of torches of subheading No. 8513.1010	14
174	85189000	Parts of microphones, loudspeakers, headphones, earphones&elec sound amplier sets	10.5
175	85245390	Other recorded magnetic tapes, width $> 6.5$ mm, nes	10
176	85389000	Parts for switches, fuses,panels and etc s of heading No 85.35 & 85.36, nes	7
177	87120041	Cross-country bicycles, 16', 18', 20'	13

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No.	HS tariff Code	Description	Margin of Preference
178	90183100	Syringes, with or without needles	8
179	90229090	Parts & accessories of apparatus of 90.22, nes	6
180	90230000	Instruments/apparatus/models, for demonstrational purposes	7
181	90328900	Automatic regulating or controlling instruments & apparatus, nes	7
182	91051100	Electric alarm clocks	23
183	92099200	Parts & accessories for musical instruments of heading No 92.02	17.5
184	94016900	Seats with wooden frames, nes	0
185	94035099	Bedroom furniture, wooden, nes	0
186	94036099	Furniture, wooden, nes	0
187	96020090	Workd veg/mineral carving material/artcls, mould/carved articles	25
188	96071100	Slide fasteners fitted with chain scoops of base metal	21
189	96081000	Ball point pens	15
190	97030000	Original sculptures & statuary, in any material	12



## Chapter 3

# SSSAP and Economic Growth in China

### 3.1 Introduction

Since the concept of human capital was introduced in modern economic analysis by Schultz (1961) and Becker (1964), it has been widely used in academic studies and policy analysis. The latest definition of human capital is from the Organization for Economic Co-operation and Development (OECD), as “the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being” (OECD, 2001, page 18).

Endogenous growth models highlight the central role played by human capital in technological development and economic growth. In the papers by Lucas (1988), Romer (1990), Mankiw, Romer, and Weil (1992), Barro and Sala-i-Martin (1997) etc., the accumulation of human capital through education and on-the-job training fosters economic growth by improving labor productivity, and by promoting technological innovation and adaptation. On the empirical side, numerous cross-country studies have extensively explored whether or not educational attainment contributes significantly to the production of overall output in an economy, and have established a positive correlation between human capital and economic growth.

This is also true for China. Since the start of economic reforms, China's economy has grown at a dramatic rate, and it is widely believed that human capital has played a significant role in the Chinese economic miracle. For instance, Wang and Yao (2003) find that human capital has contributed 11 percent to China's economic growth during the reform period (1978-1999). A more recent study by Whalley and Zhao (2010) re-examines the role of human capital in China's growth, and they find that human capital plays a much more important role than available literature suggests, 38.1% of economic growth over 1978-2008, and even higher for 1999-2008.

Education, as one of the most important ways of accumulating human capital, is therefore fundamental to social and economic development. From the view point of the Chinese government, sustaining rapid economic growth in the future will come to depend in large part on the quantity and quality of the human resources it can mobilize. Getting education policy right, particularly policy on higher education, could unlock the enormous potential of China's large population and spread the benefits of growth to all groups in society.

In this paper, we study a specific education policy, the State-Sponsored Study Abroad Programmes (SSSAP), which have been introduced in the recent years. Starting in 1996, the SSSAP are designed to select and support high-level personnel to pursue higher education in foreign universities, mainly in Western developed countries, in order to "innovate mechanisms, integrate resources, prioritize focus, achieve leap-flogging development" (China Scholarship Council, CSC). Even if as of today the personnel enrolled in the programs account for only a small portion of the highly educated population in China, the effects of such programs are likely not to be negligible. At the same time, the SSSAP will have an impact on the investment in domestic higher education given the limited availability of educational expenditure. The goal of this paper is to examine the effects of SSSAP on China's economic growth in a Lucas-type endogenous growth model. In order to explore these effects, two types of human capital, home-educated and foreign-educated human capital, are incorporated in the model.

The remainder of this paper is organized as follows. Section II provides some background information on Chinese higher education, and in particular on the SSSAP. The model and its balanced growth path are presented in section III. Section IV determines the growth-maximizing share of government spending on education, and the optimal allocation between domestic and foreign education. Section V resorts to numerical techniques to examine the effect of investment in education on economic performance, and the impact of a switch in government spending from domestic education to foreign education, given the fixed total expenditure. The final section summarizes the results and discusses some policy implications.

## 3.2 Background

To face the demand arising from rapid economic growth, the Chinese government has recently increased expenditure on education, and in 2008, the public-spending-to-GDP ratio has reached 3.48%. According to The Medium- and Long-term National Education Reform and Development Plan (2010-20), the government investment will increase steadily, with the ratio of education expenditure to gross domestic product expected to reach 4% by 2010. The education policy is skewed towards higher education which absorbs more than one quarter of total government expenditure on education, even if the enrollment rate in tertiary education reaches only 21.5% of the relevant age group.

Simultaneously, the Chinese government has accelerated the process of human capital accumulation through foreign training. In 1996, the State Sponsored Study Abroad Programmes was introduced, and under its auspices government scholarship programmes ramped up quickly. Through these programs, the Chinese government provides return international airfare and a living stipend, while the tuition and research fees are paid by the host universities. There is great variety among the 185 SSSAP: some program target rural Western provinces, others favor specific ethnic minorities, and still others are designed solely for researchers and scholars working at top universities and research centers. Meanwhile, some areas are prioritized,

including energy, environment, life sciences, space and maritime study, etc.

The State-Sponsored Study Abroad Programmes have been growing very rapidly since their inception. As shown in Figure 3.1, in 1996, when the first program was launched, only 2044 students were enrolled, and the figure remains small in the following years until 2005. However, in 2008, a total of 12,957 students/scholars were recruited for all types of state sponsored study abroad programs, a 6.5 times increase compared to the recruitment in 1996.

The SSSAP can be roughly divided into 5 major categories. Figure 3.2 shows the distribution of students/scholars across programmes. It clearly shows that the large portion of scholarships are given to senior scholars and doctoral students, contributing directly to the strengthening of domestic capacity in the tertiary education sector. In 2008, 3,845 were senior research scholar, 3,459 doctoral students, and 2,496 post-doctoral researchers, accounting for 30%, 27%, and 19% of the total, respectively.

One of the potential problems in implementing and managing these programs is students' behavior of breaching the contract, such as staying overdue. However, we have observed a quite high rate of return. During 1996-2008, a total of 48,605 have been sent abroad with 37,494 due to return, the actual return number reaches 36,614, with a return rate as high as 97.65%. Particularly in 2008, the return rate is as high as 98.34%. And it is believed that the return rate will remain at a quite high level due to China's strong economic growth.

### **3.3 The Economy**

In this section, we examine the State-Sponsored Study Abroad Programmes in an endogeneous growth model with human capital. More specifically, we employ a Uzawa-Lucas (1988) type framework, with human capital production, which has been adapted to include educational expenditure by Glomm and Ravikumar (1992). The key feature of the model is that the current level of human capital affects not only the production of final output, but also the accumulation of human capital.

We consider an infinite horizon, continuous time model with physical and human capital accumulation. The economy is populated by a large number of identical infinitely-lived representative households; and for purpose of simplicity, we assume population to be constant and normalize it to one. The economy consists of three sectors: a productive sector, a household sector, and the government. The government provides education services that are used in the production of human capital by collecting a proportional tax on output.

### 3.3.1 Production

The productive sector can be further divided into two sectors. The first sector produces final goods using physical capital and effective workforce as inputs. These goods can be consumed or invested in the creation of physical capital goods and human capital. The second sector produces human capital, using physical goods as well as human capital, as inputs. There are two types of human capital held by different individuals. The first type of human capital, home-educated human capital, denoted by  $H_1$ , applies to human capital of individuals who pursue higher education in their home country. The second type of human capital, foreign-educated human capital is denoted by  $H_2$ , and captures the human capital of individuals who receives higher education in foreign countries.

We set up a Cobb-Douglas production function for final goods  $Y$  that exhibits constant returns to physical capital and two types of human capital,  $K$ ,  $H_1$  and  $H_2$ :

$$Y = K^\alpha H_1^\sigma H_2^{1-\alpha-\sigma} \quad (3.3.1)$$

where,  $0 < \alpha, \sigma, 1 - \alpha - \sigma < 1$ , and  $K$  is aggregate physical capital. Thus, production exhibits constant returns to scale in all factors, with diminishing returns with respect to each of them. For simplicity, we do not model technological process in this paper.

### 3.3.2 The household sector

Abstracting from labor-learning-leisure choices, and assuming no government provided utility-enhancing services, the representative household maximizes the discounted stream of utility generated from goods consumption,  $C$ , over an infinite time horizon subject to its budget constraint. We assume that the intertemporal utility derived by the agent can be represented by a log utility function, so that the household problem is represented by,

$$\max U = \int_0^{\infty} e^{-\rho t} \ln(C) dt \quad (3.3.2)$$

where  $C$  is aggregate consumption and  $\rho$  is the subjective discount rate. As argued by Agenor (2009), abstracting from labor-leisure choices is a reasonable assumption in a model designed for low-income countries. People in low-income countries are unlikely to consume much leisure given the very low income they can earn.

The after-tax consumer resource can be either spent on consumption or accumulated as physical capital. For simplicity, we assume that there are no financial assets and that the public sector cannot issue debt. The main advantage derived from the non existence of financial assets or public debt is that instantaneous budget balance entails the fulfillment of the single present value budget constraint, both for the consumer and the government.

In the absence of depreciation of physical capital, the consumer's budget constraint can be written as follows

$$\dot{K} = (1 - \tau)Y - C \quad (3.3.3)$$

where  $\tau \in (0, 1)$  is the tax rate on output, which is assumed to be constant over time.

The representative agent takes public choices as given when maximizing his discounted stream of utility. To solve the optimization problem, we

formulate the present-value Hamiltonian, which is written as: <sup>1</sup>

$$J = e^{-\rho t} \ln(C) + \mu[(1 - \tau)K^\alpha H_1^\sigma H_2^{1-\alpha-\sigma} - C] \quad (3.3.4)$$

where the costate variable,  $\mu$ , denotes the shadow price of physical capital.

The boundary conditions include initial values  $K(0) = K_0 > 0$ , and also the transversality condition

$$\lim_{t \rightarrow \infty} \mu e^{-\rho t} K(t) = 0$$

Maximizing the present-value Hamiltonian yields the familiar first-order condition

$$\frac{\partial J}{\partial C} = e^{-\rho t} \frac{1}{C} - \mu = 0 \quad (3.3.5)$$

which says that goods must be allocated to be equally valuable, on the margin, if they are used either for consumption or for investment.

Meanwhile, the derivatives of the state variable satisfying the optimum growth path is given by

$$\dot{\mu} = -\frac{\partial J}{\partial K} = -\mu\alpha(1 - \tau)\left(\frac{K}{H_2}\right)^{\alpha-1}\left(\frac{H_1}{H_2}\right)^\sigma \quad (3.3.6)$$

Combining the two expressions above yields the growth rate of consumption,

$$\frac{\dot{C}}{C} = -\frac{\dot{\mu}}{\mu} - \rho = \alpha(1 - \tau)\left(\frac{K}{H_2}\right)^{\alpha-1}\left(\frac{H_1}{H_2}\right)^\sigma - \rho \quad (3.3.7)$$

### 3.3.3 Production of human capital

Recall that by assumption human capital is produced only by the public sector. Our main departure from the Uzawa-Lucas model lies in incorporating two types of human capital held by different individuals. The first type of human capital, home-educated human capital, denoted by  $H_1$ , applies to human capital of individuals who pursue higher education in their

<sup>1</sup> $J$  is used to avoid confusion since  $H$  is reserved to denote human capital; and time index  $t$  is omitted.

home country.<sup>2</sup> The second type of human capital, foreign-educated human capital, denoted by  $H_2$ , associates with human capital of individuals who receives higher education in foreign countries.

The home-educated human capital is subject to the production of the home country's education sector. We postulate a technology relating the growth of home-educated human capital to the level of human capital already attained and the public resources spent on education. More specifically, as in Glomm and Ravikumar (1992), the production of human capital is specified as a Cobb-Douglas function of government spending on education,  $I_D$ , and the existing stock of human capital,  $H_1$ .

We also assume that the home-educated human capital is subject to a positive externality from returned foreign-educated human capital,  $H_2$ . The emerging "Brain Circulation" from Silicon Valley to countries such as China and India justifies such a positive externality on the education sectors of these countries. "Brain Circulation" describes the phenomenon that a large number of foreign-born talents in Silicon Valley (the majority of them are engineering graduates from Top US universities) who have transferred advanced technology and institutional know-how to the home country. One channel is through the government of the home country, since these young talents tend to serve as government advisers in research and development projects, technical education, the adoption of information technology in the public sector and constructing science parks. Another channel is that these returned engineers cooperate with local universities or research institutes in developing new technologies. Through both channels, they have a substantial impact on the development of the home country's education sector.

Assuming that there is no depreciation for home-educated human capital, the changes in this type of human capital thus could be described by:

$$\dot{H}_1 = BI_D^\delta H_1^{1-\delta} (H_2/H_1)^\epsilon \quad (3.3.8)$$

<sup>2</sup>By "higher education", we refer to university or college studies, including both undergraduate and graduate level studies.

where,  $B > 0$  is the technology parameter for the education sector in the home country which is exogenously given, and  $\epsilon$  is the externality parameter.

As for the foreign-educated human capital, we assume that it is not a product of the home country's higher education, instead, it accumulates according to some exogenously given law of motion. More specifically, the accumulation foreign-educated human capital is related to home country's investment and the productivity of the education sector in host countries.

However, studying abroad can involve high relocation costs, as well as costs associated with learning the host country's language, identifying quality educational institutions, and more. We characterize these frictions as adjustment costs that occur as the human capital is "installed". The adjustment cost also helps us justify the home country's retention of a domestic education sector. Absent adjustment costs, the higher productivity of education sector in host countries would lead the home country to accumulate its human capital completely through foreign education.

The law of motion for foreign-educated human capital, in the absence of depreciation, is given by

$$\dot{H}_2 = B^* I_F [1 - \phi(H_2/H_1)] \quad (3.3.9)$$

where  $B^*$  captures the productivity of the education sector in western developed countries, and it is assumed that  $B^* > B$ . Every unit of human capital investment incurs  $\phi$  units of adjustment costs, which is a function of the ratio of foreign-educated human capital to home-educated human capital,  $H_2/H_1$ .

To further simplify the analysis, we assume a quadratic form for  $\phi$ , and it is constructed in such a way that the adjustment costs are zero in the steady state. We denote the adjustment cost associated with foreign-educated human capital as:

$$\phi(H_2/H_1) = (H_2/H_1 - H_2^{ss}/H_1^{ss})^2/2 \quad (3.3.10)$$

where  $H_2^{ss}, H_1^{ss}$  are the steady-state values of home- and foreign-education

human capital, respectively. The adjustment cost is a decreasing function of the ratio of home-educated to foreign-educated human capital, when its value is less than its steady-state value. At the same time, the adjustment cost is increasing in the ratio of home-educated to foreign-educated human capital.<sup>3</sup>

Therefore, the equation describing the accumulation of foreign-educated human capital is given by

$$\dot{H}_2 = B^* I_F [1 - (H_2/H_1 - H_2^{ss}/H_1^{ss})^2/2] \quad (3.3.11)$$

### 3.3.4 Government

The government collects a proportional tax on output to finance education. It provides education services that are used in the production of human capital. Furthermore, the government selects a fraction  $p$  of agents and support them to study abroad, in order to improve domestic human capital through foreign training. We assume zero non-return rate of state-sponsored students/scholars, since the actual return rate is as high as 97.65% during 1996-2008.

Given that the government budget constraint is assumed to be balanced in every period, we have

$$pI_F + (1 - p)I_D = \tau Y \quad (3.3.12)$$

Both components of public spending could be specified as fractions of total tax revenues, by defining  $I_F = \theta I_D$ , where  $\theta > 1$  is the relative investment on home-education and foreign education. In other words,

$$I_D = v\tau Y, \quad \text{where} \quad v \equiv \frac{1}{[(\theta - 1)p + 1]}$$

<sup>3</sup>Increasing marginal costs in education are highly plausible. Developing countries, may, for example, have limited capacity to prepare students for study abroad. Language training is a particularly high hurdle. Large volume of students studying abroad also require the developing country to send students to more host countries (and possible train students in more host country languages) and that may further raise adjustment costs.

### 3.4 Balanced Growth Path

To characterize the equilibrium paths, the easiest way is to begin by seeking balanced growth solutions of the system. The balanced growth equilibrium is determined as follows. Let  $c \equiv \frac{C}{K}$ ,  $k \equiv \frac{K}{H_2}$ ,  $h \equiv \frac{H_1}{H_2}$ . Equations (3.3.3), (3.3.7), (3.3.8) and (3.3.11) can be rewritten as

$$\frac{\dot{K}}{K} = (1 - \tau)k^{\alpha-1}h^\sigma - c \quad (3.4.1)$$

$$\frac{\dot{C}}{C} = \alpha(1 - \tau)k^{\alpha-1}h^\sigma - \rho \quad (3.4.2)$$

$$\frac{\dot{H}_1}{H_1} = B(v\tau)^\delta k^{\alpha\delta} h^{\sigma\delta - \delta - \epsilon} \quad (3.4.3)$$

$$\frac{\dot{H}_2}{H_2} = B^*(1 - v)\tau k^\alpha h^\sigma \left[1 - \frac{1}{2}h^{-2} + \left(\frac{H_2^{ss}}{H_1^{ss}}\right)h - \frac{1}{2}\left(\frac{H_2^{ss}}{H_1^{ss}}\right)^2\right] \quad (3.4.4)$$

These equations, together with the initial condition, and the transversality condition,  $\lim_{t \rightarrow \infty} \mu e^{-\rho t} K(t) = 0$ , characterize the dynamics of the economy. This yields the following definition:

*Definition 1.* A competitive equilibrium corresponds to a set of functions  $\{c, k, h\}_{t=0}^\infty$  and a constant tax rate  $\tau$  such that individuals maximize utility, firms maximize profits, markets clear, and the government budget is balanced. Thus, equations (3.4.1)-(3.4.4), the transversality condition, and the government budget constraint must all be satisfied.

Based on this, a balanced growth equilibrium can also be defined.

*Definition 2.* The balanced growth equilibrium is a competitive equilibrium in which consumption and the stock of physical capital, as well as human capital, all grow at the same constant rate, that is,  $\dot{C}/C = \dot{K}/K = \dot{H}_1/H_1 = \dot{H}_2/H_2 = \gamma$ , and the prices of physical and human capital are declining at constant rates.

From equations (3.4.1)-(3.4.4), the constant steady-state growth rate  $\gamma$  is given by the following equivalent forms,

$$\gamma = (1 - \tau)\tilde{k}^{\alpha-1}\tilde{h}^{\sigma} - \tilde{c} \quad (3.4.5)$$

$$\gamma = \alpha(1 - \tau)\tilde{k}^{\alpha-1}\tilde{h}^{\sigma} - \rho \quad (3.4.6)$$

$$\gamma = B(v\tau)^{\delta}\tilde{k}^{\alpha\delta}\tilde{h}^{\sigma\delta-\delta-\epsilon} \quad (3.4.7)$$

$$\gamma = B^*(1 - v)\tau\tilde{k}^{\alpha}\tilde{h}^{\sigma} \quad (3.4.8)$$

where  $\tilde{c}, \tilde{k}, \tilde{h}$  respectively denote the stationary value of  $c, k$  and  $h$ . Recall that at the steady state, the adjustment costs of installing foreign-educated human capital die out, thus its growth rate is simplified as equation (3.4.8).

## 3.5 Growth-Maximizing Policies

There are a variety of objectives that are commonly used to motivate government fiscal action, including welfare maximization, stabilization and growth maximization. Typically, maximization of welfare is characterized as the priority of benevolent governments. It involves, in this case, a central planner choosing optimally all quantities and policy instruments so as to maximize the household's discounted lifetime utility subject to appropriate constraints. By using the Hamiltonian procedure, a complete characterization of the dynamics of the model can be conducted along the lines outlined in the previous section. However, the complexity of the model precludes an analytical solution here. Therefore, we will focus on growth-maximizing policies in this section.

### 3.5.1 Optimal tax rate

We first examine the determination of the optimal tax rate, holding expenditure shares constant. This can be obtained by setting  $\partial\gamma/\partial\tau = 0$  in

equation (3.4.6), which yields the following equation,

$$\frac{\partial \gamma}{\partial \tau} = -\alpha \tilde{k}^{\alpha-1} \tilde{h}^\sigma + \alpha(\alpha-1)(1-\tau) \tilde{k}^{\alpha-2} \tilde{h}^\sigma \left( \frac{d\tilde{k}}{d\tau} \right) + \alpha\sigma(1-\tau) \tilde{k}^{\alpha-1} \tilde{h}^{\sigma-1} \left( \frac{d\tilde{h}}{d\tau} \right) = 0 \quad (3.5.1)$$

Let  $\varepsilon_{\tilde{k}/\tau}$  and  $\varepsilon_{\tilde{h}/\tau}$  denote the elasticity of the steady-state value of  $k$  and  $h$  with respect to tax rate  $\tau$ , respectively. After some rearrangement, the condition for the optional tax rate can be simplified to

$$\frac{-\tau^*}{1-\tau^*} + (\alpha-1)\varepsilon_{\tilde{k}/\tau} + \sigma\varepsilon_{\tilde{h}/\tau} = 0 \quad (3.5.2)$$

Similarly, setting  $\partial\gamma/\partial\tau = 0$  in equation (3.4.7) and (3.4.8), we obtain

$$\delta + \alpha\delta\varepsilon_{\tilde{k}/\tau} + (\alpha\delta - \delta - \epsilon)\varepsilon_{\tilde{h}/\tau} = 0 \quad (3.5.3)$$

$$1 + \alpha\varepsilon_{\tilde{k}/\tau} + \sigma\varepsilon_{\tilde{h}/\tau} = 0 \quad (3.5.4)$$

Combining equations (3.5.2), (3.5.3) and (3.5.4) gives the growth-maximizing value of the tax rate

$$\tau^* = 1 - \alpha \quad (3.5.5)$$

which means that with spending shares on home- and foreign-educated human capital held constant, the growth-maximizing tax rate is equal to the elasticity of output with respect to (total) human capital in our framework. This result is consistent with the results from previous studies in endogenous growth models where human capital is present.

### 3.5.2 Optimal allocation

Next, we consider the optimal fraction of education expenditure to be devoted to SSSAP, taking the total spending on education as given. This can be obtained by setting  $\partial\gamma/\partial p = 0$  in equations (3.4.6), (3.4.7) and (3.4.8), which yields the following system of equations in  $p, \varepsilon_{\tilde{k}/p}$  and  $\varepsilon_{\tilde{h}/p}$ :

$$(\alpha-1)\varepsilon_{\tilde{k}/p} + \sigma\varepsilon_{\tilde{h}/p} = 0 \quad (3.5.6)$$

$$\frac{-\delta(\theta - 1)p}{[(\theta - 1)p + 1]} + \alpha\delta\epsilon_{\tilde{k}/p} + (\sigma\delta - \delta - \epsilon)\epsilon_{\tilde{h}/p} = 0 \quad (3.5.7)$$

$$\frac{1}{[(\theta - 1)p + 1]} + \alpha\epsilon_{\tilde{k}/p} + \sigma\epsilon_{\tilde{h}/p} = 0 \quad (3.5.8)$$

Combining the above equations, we obtain the growth-maximizing fraction of agents who are sent to developed country to accumulate foreign human capital:

$$p^* = \frac{(1 - \alpha)(\delta + \epsilon) - \sigma\delta}{\sigma\delta(\theta - 1)} \quad (3.5.9)$$

The result shows that with the given educational expenditure, its optimal allocation between home-education and SSSAP is determined by the the elasticity of production to human capital, the relative cost of foreign education, as well as the elasticity of human capital output to government spending in education.

### 3.6 Numerical Simulation

Due to the complexity of the model, we resort to numerical techniques to characterize the growth-maximizing tax rate and allocation of educational expenditure. The numerical values assigned to the variables and parameters of the system dwell as much as possible on the existing empirical literature and are chosen to roughly match some well-documented facts about low-income developing countries since China as a whole is a low-income country.

The elasticity of final output with respect to physical capital,  $\alpha$ , is set equal to 0.70. Therefore, the elasticity of production with respect to human capital is around 0.3. As mentioned before, Wang and Yao (2003) find that human capital has contributed 11 percent to China's economic growth during the reform period (1978-1999). However, Whalley and Zhao (2010) point out that human capital contributes as high as 30% to China's economic growth over 1978-2008, and even higher rate for 1999-2008. Therefore, our value of  $\alpha$  lies in a feasible range according to previous studies.

Next consider the human capital technology. The elasticity with respect to government spending on education services is set equal to 0.3 in the base case. This is consistent with the parameter values used by Chen (2005). The

estimate used here is probably quite relevant for China, where education is to a very large extent publicly provided.

Regarding the fiscal variable, the tax rate on output,  $\tau$ , which is also the share of total government spending on education relative to output, is set at 0.04. The value of  $\tau$  used here corresponds to the target value set by the Chinese government in The Medium- and Long-term National Education Reform and Development Plan (2010-20). The other government control variable,  $p$ , is calculated in the following way. According to National Bureau of Statistics of China, there are around 13,000 students/scholars who enrolled in SSSAP in 2010, and nearly 465,000 in China higher education. Therefore, the fraction of agents who get scholarship for studying abroad from the Chinese government is nearly 2.8 percent. In addition, we choose a value of 5% to examine the effect on growth rate of a larger share of foreign-educated human capital.

The values of the remaining parameters are set as follows. The rate of time preference,  $\rho$ , is set at 4%, a fairly conventional choice in the literature. This leads to a discount factor of approximately 0.96 (see, for instance, Ghosh and Roy (2004)). The relative cost of foreign-educated human capital,  $\theta$ , is set to 5, since the domestic per capital educational expenditure is about 4550 in equivalent USD, while the scholarship from SSSAP is around 20,000 USD per person. Finally, we assume that the productivity of the education sector in western developed countries is 1.5 times higher than that in China.

In Figure 3.3, we plot the calibrated economic growth rate against tax rate, taking the allocation of educational expenditure as given. The concavity of the function depicted in Figure 3.3 is very similar to other important findings in the theory of public finance. The growth rate is rapidly increasing with the tax rate, an increase in the tax rate from 1 to 10 per cent raises the growth rate by more than 10 percentage points. The growth rate reaches its maximum when the tax rate is around 30 percent, which is consistent with our theoretical predictions.

Figure 3.4, 3.5 and 3.6 show the growth paths of consumption to physical capital ratio,  $c$ , physical capital to foreign-educated human capital ratio,  $k$ ,

and home- to foreign-educated human capital ratio,  $h$ , respectively. The consumption to physical capital ratio,  $c$ , mirrors the pattern of growth rate, and reaches its peak when the total educational expenditure represents about 30 percent of the GDP. The physical capital to foreign-educated human capital ratio,  $k$ , and home- to foreign-educated human capital ratio,  $h$ , share a similar pattern. They drop sharply when the tax rate moves from 1 to 10 percent, and afterwards remain flat.

Another experiment we carry out is to keep the total educational expenditure constant, as to see how the allocation of education expenditure will affect the growth rate. In the base case, the ratio of educational expenditure to GDP (i.e. the tax rate in our framework) is 4%, which is the target value in China's 11th Five Year Plan, while another educational expenditure-to-GDP ratio, 30%, is chosen for comparative purpose. From Figure 3.7, we can easily find that the growth rate increases sharply with the fraction of agents studying abroad with government sponsorship, but decreases gradually when this fraction is higher than 30 percent. This result indicates that the SSSAP cannot efficiently increase the growth after a threshold value, and might even hurt China's economy if there is high non-return rate of students/scholars.

In summary, the calibration results show that the ratio of educational expenditure to GDP which maximizes China's economic growth is much higher than the current level, and thus there is plenty of room for Chinese government to increase public spending on education. Moreover, a budget-neutral shift in government spending from home- to foreign-educated human capital has a positive effect on China's economy, given the overall structure of the model and the calibrated parameters. The growth rate will increase sharply due to the higher productivity of education sector in Western developed countries. It will then converges to a certain level, which is higher than the growth rate without state-sponsored studying abroad programmes.

### 3.7 Conclusions

Existing empirical studies, for instance Fleisher and Wang (2004), have shown that human capital plays a significant role in boosting Chinese economy. However, there has been a huge underinvestment in education. In fact, China's government investment in Education is only around 3.5% in year 2008, a quite low value compared with the international standard. Given the current situation, the question of how to effectively and efficiently allocate the scarce fiscal funds becomes a big challenge faced by policy makers.

The Chinese government has launched a series of State-Sponsored Study Abroad programs in recent years. With the proportional tax rate on output fixed, and therefore the total expenditure on education unchanged, the introduction of such SSSA programs will inevitably decrease the government spending on domestic education. The goal of this paper has been to explore the effect on growth rate of such a budget-neutral shift in government spending.

We examine the SSSAP in an endogenous growth model with two types of human capital. After describing the model, we have characterized the balanced growth path of the model. Furthermore, we have solved for the growth-maximizing tax rate which is used to finance education and the optimal allocation of government spending on education between domestic education and foreign training. It was shown that the optimal tax is equal to  $1 - \alpha$ , which is the elasticity of final goods with respect to total human capital. It is also shown that the growth-maximizing allocation of public spending on education depends on the elasticity of human capital with respect to education expenditure, the relative cost of studying abroad, as well as the elasticity of final goods with respect to human capital.

Numerical techniques are used to examine, on one hand, the pattern of growth rates against different ratio of educational expenditure to GDP, taking the allocation of expenditure as given, and on the other hand, the pattern of growth rates against different fraction of state-sponsored students/scholars, with total education expenditure fixed. The calibration results show that the educational expenditure-to-GDP ratio which maximizes

economic growth is always in the range of 0.20-0.35, which is consistent with our theoretical predictions. The results also show that a budget-neutral shift from home-educated to foreign-educated human capital is growth-enhancing, even though it finally leads the growth rate converge to a certain level.

# References

- [1] Agenor, P.R., 2009. "Schooling and Public Capital in a Model of Endogenous Growth", *Economica* (2009), pp. 1-25.
- [2] Becker. G.S., 1964. "Human Capital: a Theoretical and Empirical Analysis, with Special Reference to Education." University of Chicago Press.
- [3] Cerra, V., Tekin, S., and Turnovsky, S. J., 2008. "Foreign Aid and Real Exchange Rate Adjustments in a Financially Constrained Dependent Economy", Working paper No. 08/204, International Monetary Fund.
- [4] Chen. H., 2005. "Education Systems, Growth and Income Distribution: a Quantitative Analysis", *Journal of Development Economics*, 70, 443-77.
- [5] Constant, A.F., Tien, B.N., Zimmermann, K. F., and Meng. JZ., 2010. "China's Overt Economic Rise and Latent Human Capital Investment: Achieving Milestones and Competing for the Top." IZA Policy Paper No. 19.
- [6] Demurger, S., 2001. "Infrastructure Development and Economic Growth: An Explanation for Regional Disparities in China." *Journal of Comparative Economics* 19: pp. 95-117.
- [7] Fleisher, B.M., and Wang, X., 2004. "Skill Differentials, Return to Schooling and Market Segmentation in a Transition Economy: The Case of Mainland China." *Journal of Development Economics*, 73(1), 315-328.

- [8] Fleisher, B.M., and Chen, J., 1997. "The Coast-Noncoast Income Gap, Productivity and Regional Economic Policy in China." *Journal of Comparative Economics* 252: pp. 220-236.
- [9] Fleisher, B.M., Li, H.Z. and Zhao, M.Q., 2009. "Human Capital, Economic Growth, and Regional Inequality in China." *Journal of Development Economics*, forthcoming.
- [10] Ghosh, S. and Roy, U., 2004. "Fiscal Policy, Long-Run Growth, and Welfare in a Stock-Flow Model of Public Goods." *Canadian Journal of Economics*, 37: pp. 742-56.
- [11] Glomm, G. and Ravikumar, B., 1992. "Public versus Private Investment in Human Capital Endogenous Growth and Income Inequality." *Journal of Political Economy*, University of Chicago Press, vol. 100(4), pp. 813-34.
- [12] Heckman, J., 2005. "China's Human Capital Investment", *China Economic Review* 16 (2005) 50-70.
- [13] Lucas, Robert Jr., 1988. "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Elsevier, vol. 22(1), pp. 3-42.
- [14] Mankiw, N. G., Romer D., and Weil D.N., 1992. "A Contribution to the Empirics of Economic Growth," *The Quarterly Journal of Economics*, Vol. 107, No.2., pp. 407-437.
- [15] Schultz, Theodore W., 1961. "Investment in Human Capital." *American Economic Reviews*, 51(1): 1-17.
- [16] Wang, Y and Yao Y., 2003. "Sources of China's Economic Growth 1952-1999: Incorporating Human Capital Accumulation." *China economic Review*, vol. 14, pp. 32-52.
- [17] Whalley J. and Zhao XL, 2010. "The Contribution of Human Capital to China's Economic Growth." NBER working paper 16592.

Figure 3.1: Recruitment of state sponsored study programme from 1996-2008

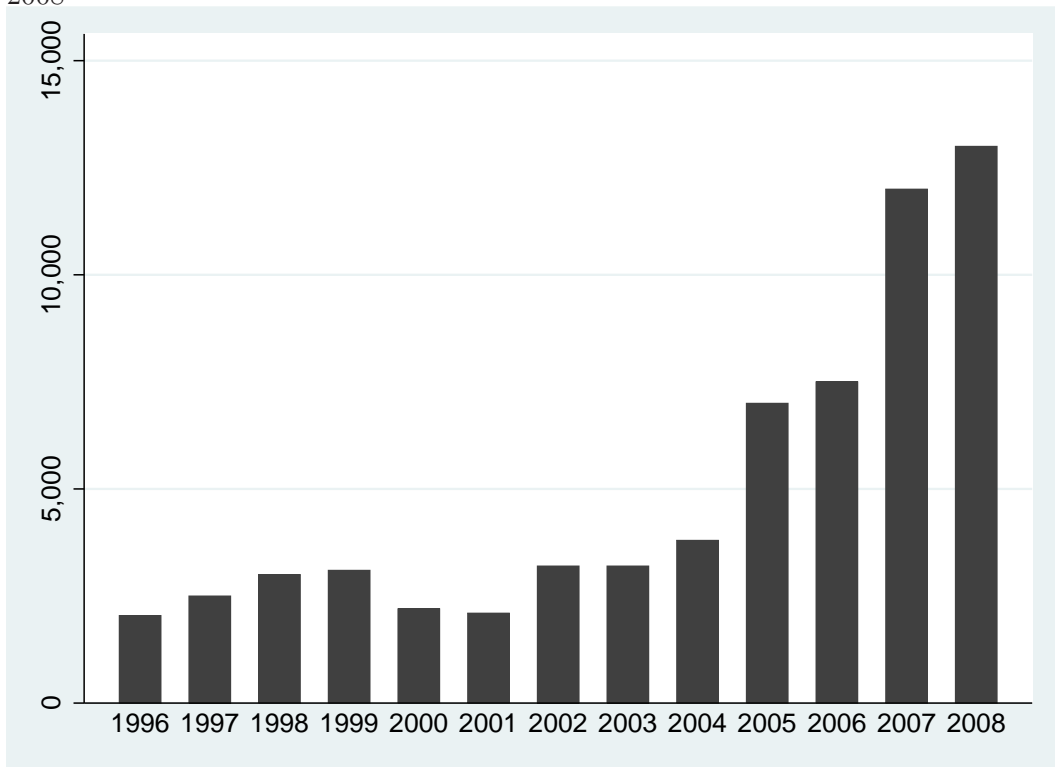


Figure 3.2: The distribution of scholarships across programmes in 2008

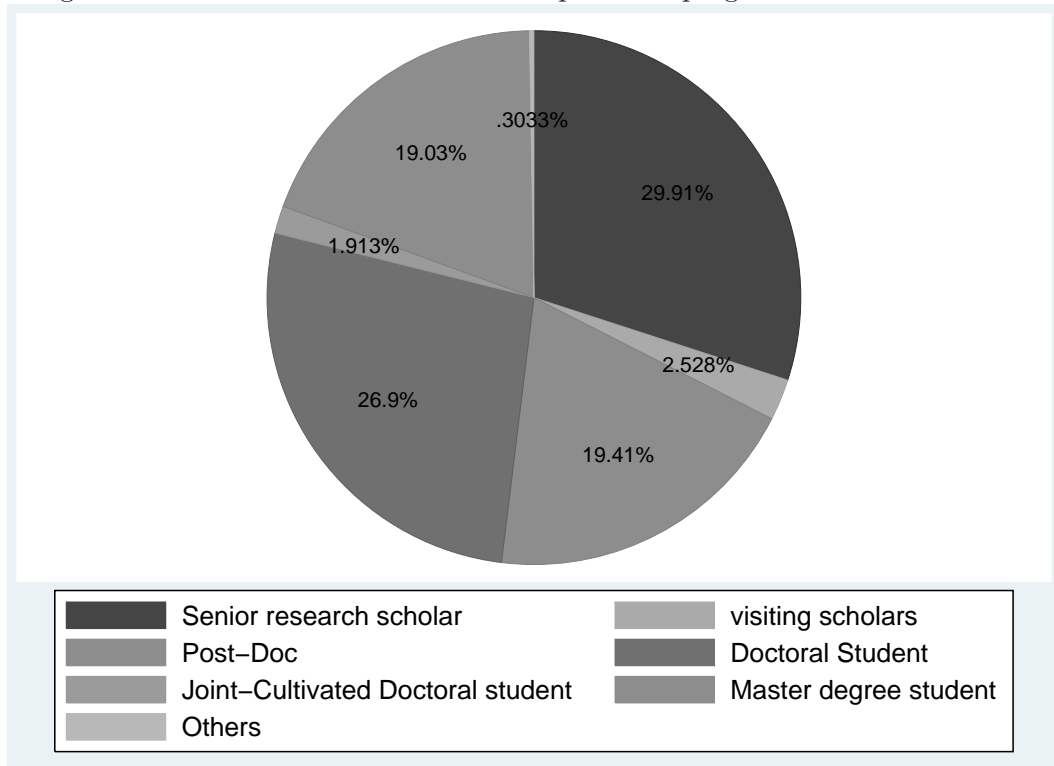


Figure 3.3: Growth rate against tax rate: fixed allocation of education expenditure

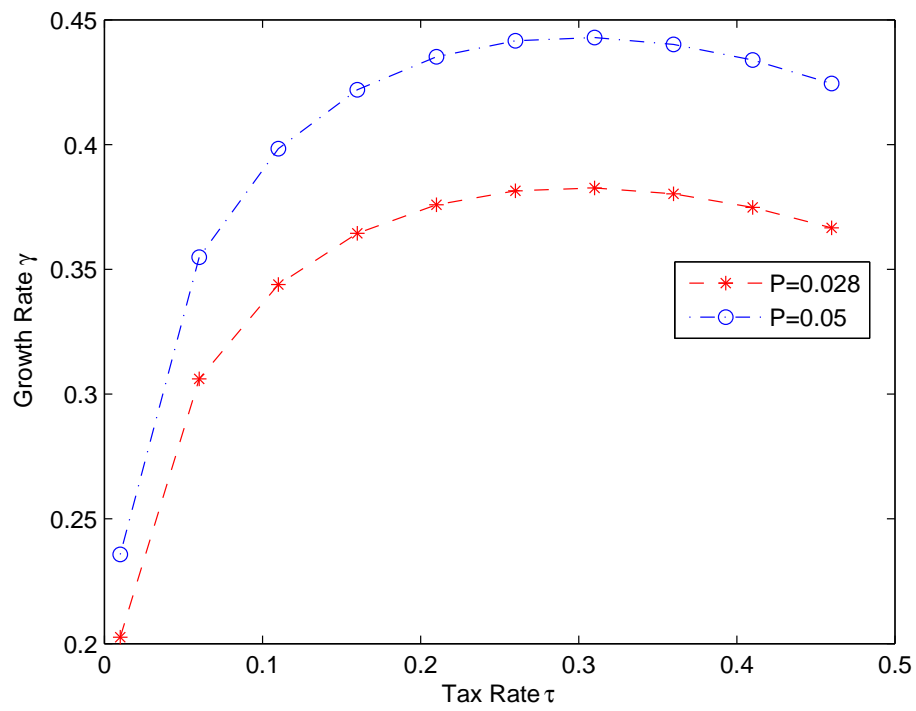


Figure 3.4: Growth path of consumption to physical capital ratio

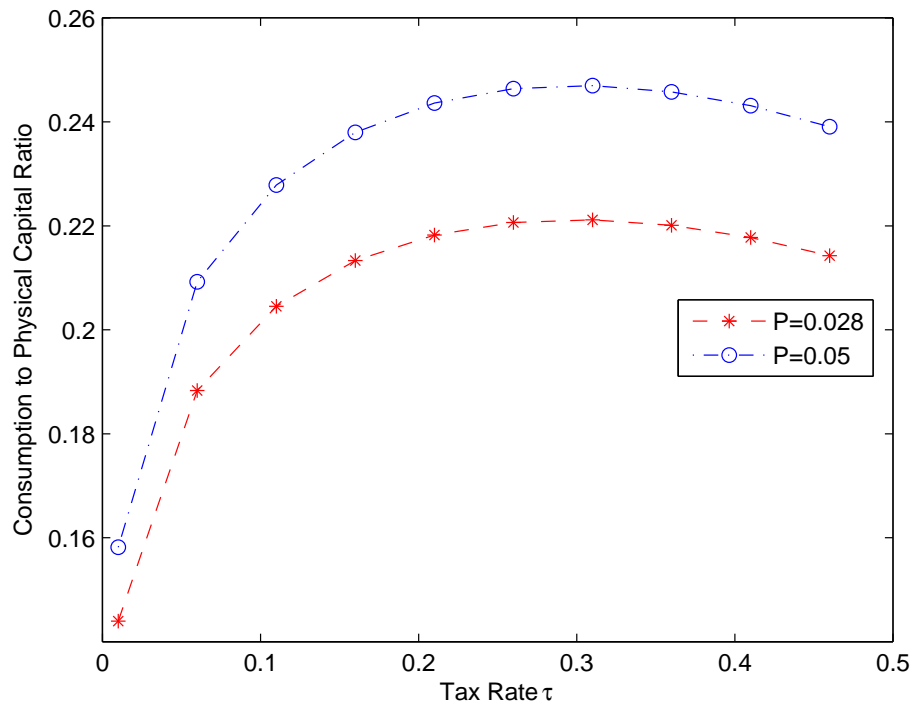


Figure 3.5: Growth path of physical to foreign-educated capital ratio

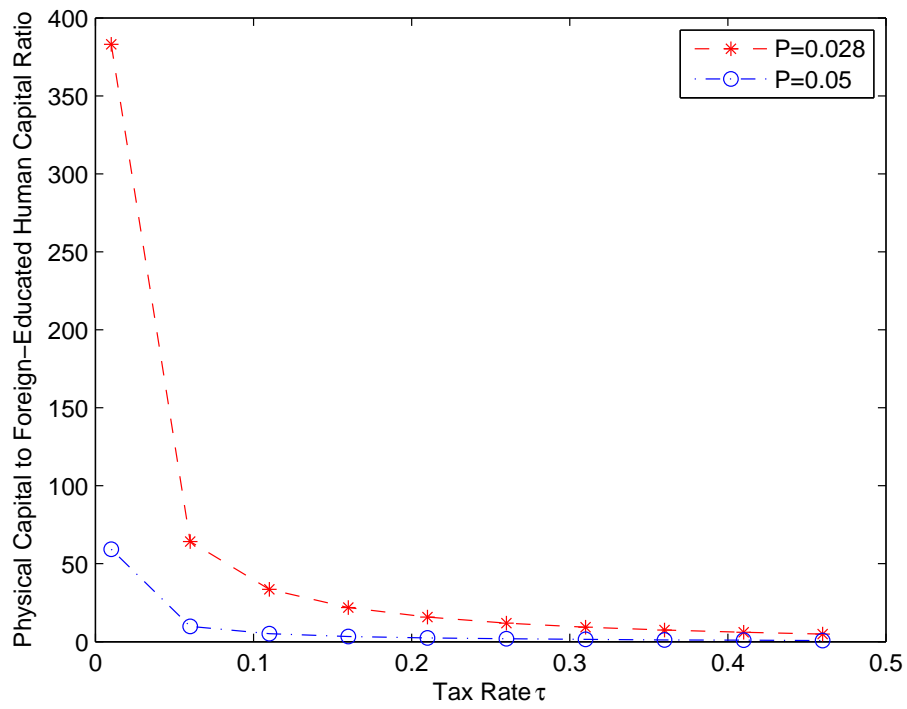


Figure 3.6: Growth path of home-educated to foreign-educated capital ratio

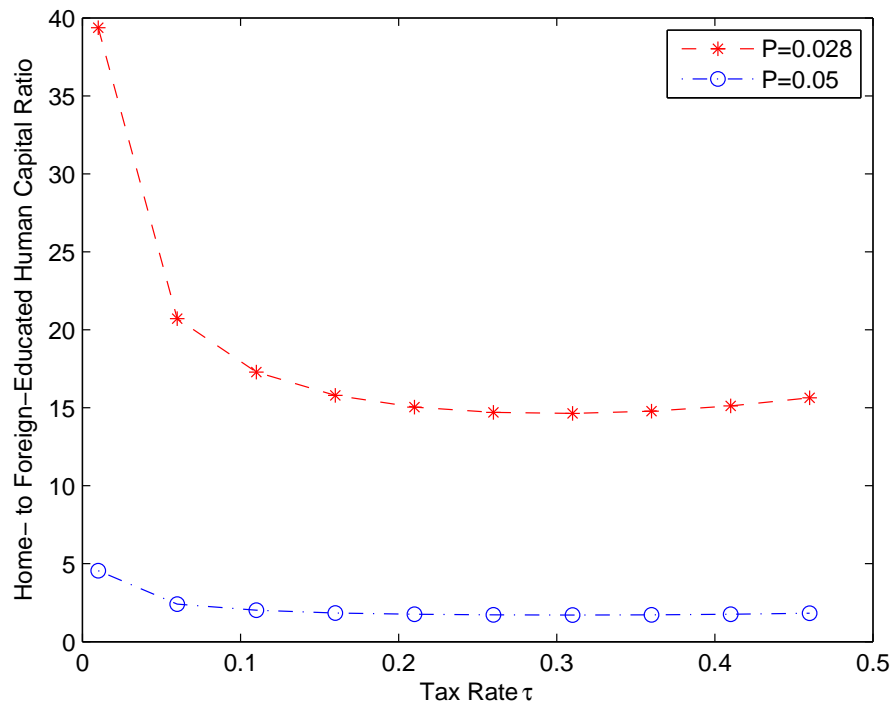
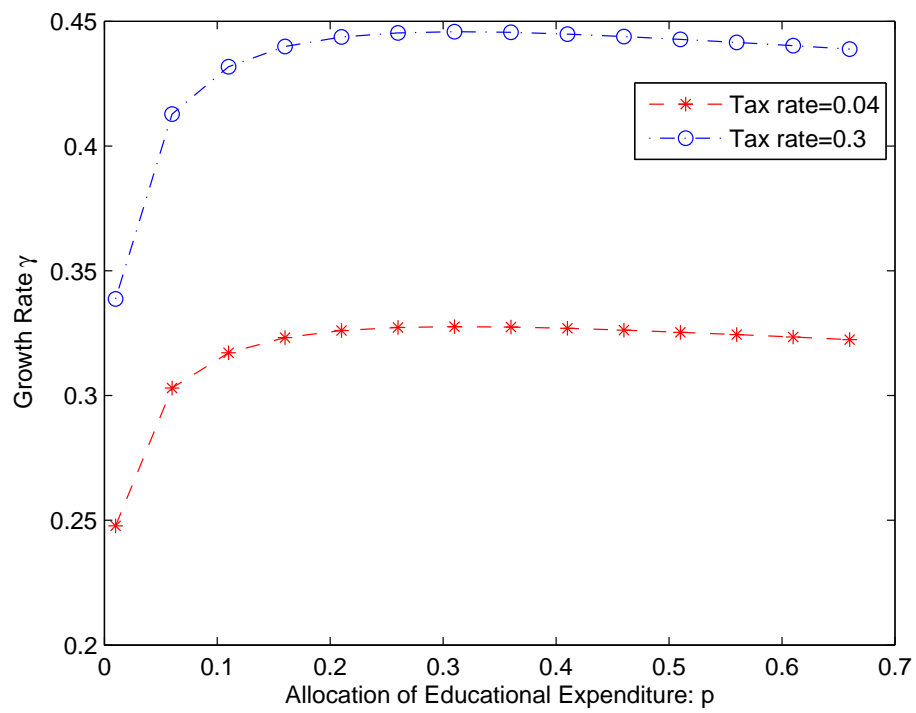


Figure 3.7: Growth rate against allocation: fixed total education expenditure





## Chapter 4

# Individual Attitudes towards Europeanization of Immigration Policy

### 4.1 Introduction

Immigration is a crucial issue in 21st century Europe due to its importance to the evolving EU single market. The population of foreigners in European Union member countries has risen sharply in recent years and a large share of jobs is occupied by foreign workers. According to the 2011 International Migration Outlook, the inflows of foreign population into the EU-25 has peaked at 2.5 millions in 2009, and the share of foreign-born in total labor force is greater than 10% in most EU member countries. Facing such large inflows of foreigners, more and more EU citizens rank the importance of immigration higher than terrorism, education, environment etc. Immigration policies in main destination countries also become more restrictive over the last few decades, although standard economic theories suggest that the gains from free migration could be very large.

Given the EU's commitment to free movement of labor within the union, there is growing awareness both among politicians and academics that at least some harmonization of immigration policies among the EU countries is

required. In fact, the EU has been working to build a common immigration policy ever since the early 1990s. The Treaty of Amsterdam, which entered into force in 1999, laid out a plan to develop “an area of freedom, justice and security”, and represented the first step to develop a common EU migration policy. The post-Amsterdam period showed some important developments. In particular, the Lisbon Treaty, which is signed in 2007, significantly widens the EU’s competences on asylum and immigration policies. It sets for the EU the specific goal of developing “common policies” for both asylum and immigration, and further extends qualified majority voting and co-decision in these areas.

Although the EU has recently gained some influence over immigration policy, the current situation is far from a common immigration policy. Member states have often demonstrated their reluctance to delegate powers to the supranational institutions, particularly concerning legal labor migration, by acting outside of the supranational organizations or by including provisions in the treaties. Even though the Lisbon Treaty significantly widens the EU’s competences on asylum and immigration policies, article 79(5) states that “this Article shall not affect the right of Member States to determine volumes of admission of third-country nationals coming from third countries to their territory in order to seek work”.

The failure of cooperation on harmonization of immigration policy is resulting from the heterogeneous preferences over immigration across member states. There are considerable differences among the member states in terms of their labor markets, demographic trends, history of immigration etc. Former colonial states such as France and the United Kingdom were already immigration countries in the 19th century, other European states, such as Germany and Austria, did not become destination countries of immigration until after the Second World War. Recently, the southern member states, such as Italy, also become attractive to immigrants. Besides strong differences with regard to the migration figures, the geographical origin of the biggest immigrant groups and immigrants’ levels of qualification also vary widely from one member state to another. These differences make it

difficult to reach agreement on cooperation on legal migration policy at the EU level, because each member state is unlikely to accept a measure which does not reflect its preferences.

From where does this national opposition to harmonization of immigration policy originate? In democratic societies, government policies will largely reflect the individual preferences of voters. Politicians are often concerned about getting re-elected, and hence will be interested in the feelings of the voters. As a result, we expect the citizens' attitudes to play a role in shaping the government policies. In particular, individual preferences are an essential input into any complete model of immigration policy-making.

The purpose of this paper is to analyze the opinion of EU citizens as assigning responsibilities to European institutions in the domain of immigration policy from a theoretical and empirical point of view. Why some countries are more supportive of allocating policy prerogatives to the European level of government than others? Which different factors are associated with individual preferences over a common immigration policy? To shed light on this issue, we develop a simple theoretical model. We find Europeanization of immigration policy is likely to increase the inflows of low-skilled foreign workers. We also find that natives' education levels strongly affect their support of granting more power to EU institutions.

The structure of the remaining paper is as follows: section II gives a brief survey of previous literatures on EU integration and determinants of attitudes towards immigrants, while section III presents the simple theoretical model. In section IV we describe the data used in the empirical analysis and provide some summary statistics. Results of benchmark models and robustness checks are respectively presented in section V and section VI. Finally, section VII concludes.

## 4.2 Literature Review

Our paper is broadly related to two branches of literature. One is the literature focus on explaining EU integration, particularly the role of public opinion in the European integration process; the other is studies which ex-

amine the determinants of individuals' attitudes towards immigrants.

There is a wide range of theories that seek to explain EU integration, such as neo-functionalism, constructivism, federalism, and multi-level governance. In particular, since Oates (1972), many political economists, drawing on the fiscal federalism theory, have tried to ascertain the optimal allocation of policies to different levels of government. This optimal allocation has been discussed as resulting from a trade-off: on the one hand, the benefits that centralization may bring in terms of internalizing externalities and reducing production costs by means of economies of scale; on the other hand, the welfare losses involved in centrally and uniformly providing goods to large populations with heterogeneous preferences. For instance, Alesina *et al.* have discussed the desirable allocation of policy responsibilities among local, national, and the EU levels from this point of view.<sup>1</sup>

Political scientists have extensively studied how public opinion shapes and constrains the process of European integration, and have offered a variety of, sometimes conflicting, theories to explain why citizens vary in their support for European integration. Most scholars have explained preferences over European integration in terms of its economic consequences, and have suggested that lower-skilled workers are likely to have more negative evaluations of European integration since they are thought to be less competitive in an integrated market (see, for example, Scheve (2000)). While some researchers, for instance, Hooghe and Marks (2004), have argued that national identity is instead a key source of public opinion on European integration.

However, despite its undisputed importance, the issue of harmonization of immigration policy is considerably under researched. To be best of our knowledge, Luedtke (2005) is the only contribution. Based on Eurobarometer survey data, the author empirically investigated the effect of national identity on public opinion towards European Union control over immigration policy, and found that those who identify with their nation states are less likely to support EU control over immigration policy than those identify with "Europe". In this paper, we study on the same issue, that is EU

<sup>1</sup>See, for example, Alesina and Wacziarg (1999), and Alesina, Angeloni, and Schuknecht (2005).

citizens' opinion towards delegating more powers to EU institutions over immigration policy, from a labor market competition channel though.

Special attention has been devoted to recent research on the determinant of public opinion towards immigration, several recent studies have highlighted the importance of labor-market mechanism in shaping individual preferences. Scheve and Slaughter (2001) find a strong relationship between education and more favorable attitudes to further immigration, which is consistent with the hypothesis that the low skilled are opposed to immigration because of a fear of labor market competition predicted by the Heckscher-Ohlin trade model and the factor-proportions analysis (FPA) model. Mayda (2006), arguing within a similar theoretical setting, carries out a cross-country analysis, finding evidence for a strong positive correlation between individual skill level and pro-immigration attitudes in countries where immigration is relatively unskilled, i.e. the relative skill ratio of natives to immigrants is high.

In the papers mentioned above, particular attention has been devoted to the role played by education. The relationship on education and pro-immigration attitudes is interpreted as supporting the hypothesis that attitudes are - at least in part - determined by economic self-interest as the FPA model suggests. Recent studies have questioned this interpretation. Hainmueller and Hiscox (2007), using European data, find that the relationship between education and attitudes has very little, if anything, to do with fears of labor market competition. In their view, education is not a proxy for human capital, but instead captures a direct link to general attitudes towards immigration. In particular, more educated individuals support more cultural diversity, regardless of the immigrants' skill level.

Another channel through which migration affects the well being of natives is the welfare-state channel. The welfare-state channel is of particular importance in Europe since the member countries are characterized by a large welfare state, through which the public sector redistributes a substantial fraction of national income across individuals. In this context, immigration has a non-negligible impact on public finances, since foreign workers

both contribute to and benefit from the welfare state. Facchini and Mayda (2009), using the 1995 National Identity Module of the International Social Survey Program (ISSP), show that in countries where natives are on average more skilled than immigrants, individual income is negatively correlated with pro-immigration preferences, which is consistent with the welfare state channel under the tax adjustment model.

In addition to these two economic determinants, there are also non-economic channels through which opinions over immigration may be shaped. Opposition to immigration may be motivated by reasons which relate to the cultural and ethnic difference of the immigrant population. For instance, the role of cultural drivers of attitudes has been explored by Dustmann and Preston (2007), who find that racial and cultural prejudice are very important drivers in the UK case. Gang et al. (2010) also find that culture and racial prejudice are key factors influencing the attitudes of European Union citizens towards foreigners. Along the same line, Katav-Hez (2010) points out that social norms strongly affect a local population's attitudes towards immigration.

In summary, our study attempts to demonstrate a link between education, as a proxy for human capital, and support for European integration in the domain of immigration policy, while controlling for other factors. Such a focus builds a bridge between the literature on public opinion and the literature on immigration politics in the realm of European integration.

### 4.3 Theoretical Framework

In this section, we develop a simple model to answer two questions: 1) what is the likely policy effect of harmonization on immigration policy - that is, will a transfer of control to the EU lead to more immigrants? 2) How will natives differing in their human capital endowment react to the centralization of immigration policy?

### 4.3.1 Centralization of immigration policy

We consider two symmetric countries, indexed by  $j \in \{1, 2\}$ . Each country is populated by a continuum of citizens who differ in their human capital endowments. We define immigration policy as the choice of the exact number of foreign workers from the third country,  $M_j$ , to be admitted in each destination country.

Following Benhabid (1995), we suppose each native  $i$  in country  $j$  supplies one unit of “raw” labor and  $h_i$  units of human capital, whereas for simplicity migrants are assumed to supply only one unit of “raw” labor. Thus, natives could be indexed by the units of human capital that they own. The density of natives is given by the continuous density function  $N(h)$ , defined on  $[0, \bar{h}]$ . Therefore, the population size of natives of economy  $j$ ,  $N_j$ , is given by

$$N_j = \int_0^{\bar{h}} N(h) dh$$

and the total human capital stock of country  $j$ ,  $H_j$ , is

$$H_j = \int_0^{\bar{h}} N(h)h dh$$

We assume that in the receiving countries, a homogenous final good is produced using two factors - “raw” labor and human capital. The aggregate output is given by  $Y = F(H, L)$ , where  $L = N + M$ , and  $F$  is an aggregate production function exhibiting constant returns to scale. Per capita output can be written as  $y \equiv Y/L = F(H/L, 1) \equiv f(h)$ , where  $h = H/L$  is the after-immigration average per capita human capital stock. For convenience, later in this paper we will assume that the production function is a Cobb-Douglas type, that is,  $Y = H^\alpha L^{1-\alpha}$ , with  $\alpha \in (0, 1)$ .

Under the assumptions of perfectly competitive factor markets and profit maximization by the representative firm, input factors are paid their marginal productivities:

$$\omega = \frac{\partial Y}{\partial L}, \quad \text{and} \quad r = \frac{\partial Y}{\partial H}$$

The receiving country  $j$  controls the access to its territory and can there-

fore determine the number of foreign workers to be admitted,  $M_j$ ; similarly the other country determines  $M_{-j}$ . Let the vector  $\mathbf{M} = (M_j, M_{-j})$  summarize the immigration policies implemented by the two countries.

Following Facchini, Lorz and Willmann (2006), we assume that though the cost to country  $j$  is primarily determined by the number of foreign workers it accepts ( $M_j$ ), there are spill-overs of migrants. More specifically, we assume that only a fraction,  $\lambda$ , of the immigrants admitted by country  $j$  choose country  $j$  as their final destination, whereas the rest,  $(1 - \lambda)$ , end up moving to the other country. In this case, the total number of foreign workers in country  $j$  is actually equal to  $[\lambda M_j + (1 - \lambda)M_{-j}]$ .

We now introduce costs of immigration. Although there are many direct and indirect costs resulting from hosting migrants, in this paper we will focus on one specific type of cost which is related to the integration of migrants' community into the receiving country. The so-called "congestion effects", as in Giordani and Ruta (2009), imply that it may become more and more difficult to integrate larger community of foreigners in the destination country. This would suggest that the costs of immigration are convex in the number of migrants actually staying in the destination country.

More specifically, assume that the overall cost of immigration is described by a twice continuously differentiable function  $C(M)$ , with  $C'(\cdot) > 0$ ,  $C''(\cdot) > 0$ ,  $C(0) = 0$ ,  $C(\bar{M}) = \bar{C}$ . Consider the following cost function:<sup>3</sup>

$$C_j(\mathbf{M}) = \frac{[\lambda M_j + (1 - \lambda)M_{-j}]^\eta}{\eta(\eta - 1)}, \text{ with } \eta > 2$$

We assume that the central planner in each receiving country does not care about the welfare of foreign workers. In this setting, we can define the net aggregate welfare in country  $j$  as the sum of factor payments to natives net of immigration costs:

$$N\Pi_j \equiv \omega_j(\mathbf{M})N_j + r_j(\mathbf{M})H_j - C_j(\mathbf{M})$$

Under a non-cooperative framework, the social planner of each country

<sup>3</sup>The term  $\eta(\eta - 1)$  at denominator is introduced just to simplify the calculations.

maximizes net aggregate welfare by choosing the number of migrants allowed to enter the country, taking the immigration policy of the counterpart as given. The corresponding first order condition (FOC) is given by:

$$\frac{\partial N\Pi_j}{\partial M_j} = \frac{\partial \omega_j}{\partial M_j} N_j + \frac{\partial r_j}{\partial M_j} H_j - \frac{\partial C_j}{\partial M_j} = 0$$

With Cobb-Douglas production function and the cost function assumed earlier, after some algebra, the FOC above becomes

$$\lambda\alpha(1-\alpha)\left(\frac{H_j}{L_j}\right)^\alpha \frac{[\lambda M_j + (1-\lambda)M_{-j}]}{L_j} = \frac{\lambda}{\eta-1} [\lambda M_j + (1-\lambda)M_{-j}]^{\eta-1}$$

where,

$$L_j = N_j + [\lambda M_j + (1-\lambda)M_{-j}]$$

We can show that, if the cost function is “sufficiently convex”, the welfare function is everywhere strictly concave, which ensures that, if  $M_j^*$  exists which solves the FOC above, it is a global interior maximum. In fact,

$$\begin{aligned} \frac{\partial^2 N\Pi_j}{\partial M_j^2} &< 0 \\ \Leftrightarrow \eta &> \frac{\ln[\alpha(1-\alpha)H_j^\alpha L_j^{\alpha-1}[(\alpha-1)\frac{\lambda M_j+(1-\lambda)M_{-j}}{L_j} + 1]]}{\ln[\lambda M_j + (1-\lambda)M_{-j}]} + 2 \end{aligned}$$

Intuitively, the equilibrium policy is an interior solution if the congestion effects of immigration in the destination country, as captured by the cost elasticity  $\eta$ , are sufficiently strong.

Given the symmetry assumption, it is easy to show that  $M_j = M_{-j} = M^N$ , where  $N$  stands for Nash equilibrium. The FOC could be further simplified as

$$\lambda\alpha(1-\alpha)\left(\frac{H_j}{N_j + M^N}\right)^\alpha \frac{M^N}{N_j + M^N} = \frac{\lambda}{\eta-1} (M^N)^{\eta-1} \quad (4.3.1)$$

Regarding the centralization of immigration policies, suppose there exists a supranational organization (like the EU) which aims at maximizing the combined welfare of two receiving countries. More specifically, this suprana-

tional institution maximizes a welfare function that the utility of all natives in both countries equally weighted. In other words, it will be the solution to the following problem:

$$\max W = N\Pi_1 + N\Pi_2$$

The corresponding FOC is given by:

$$\frac{\partial W}{\partial M_j} = \frac{\partial \omega_j}{\partial M_j} N_j + \frac{\partial r_j}{\partial M_j} H_j + \frac{\partial \omega_{-j}}{\partial M_j} N_{-j} + \frac{\partial r_{-j}}{\partial M_j} H_{-j} - \frac{\partial C_j}{\partial M_j} = 0$$

Again, substituting the specific production function and costs function, the FOC becomes:

$$\begin{aligned} \lambda\alpha(1-\alpha)\left(\frac{H_j}{L_j}\right)^\alpha \frac{[\lambda M_j + (1-\lambda)M_{-j}]}{L_j} + (1-\lambda)\alpha(1-\alpha)\left(\frac{H_{-j}}{L_{-j}}\right)^\alpha \frac{[(1-\lambda)M_j + \lambda M_{-j}]}{L_{-j}} \\ = \frac{\lambda}{\eta-1} [\lambda M_j + (1-\lambda)M_{-j}]^{\eta-1} \end{aligned}$$

Taken together, the first-order conditions for the two countries imply that the number of foreign workers admitted into each country is the same, i.e.,  $M_j = M_{-j} = M^U$ . Due to the symmetry ( $H_j = H_{-j}$ ,  $N_j = N_{-j}$ ), this common number satisfies the following condition:

$$\alpha(1-\alpha)\left(\frac{H_j}{N_j + M^U}\right)^\alpha \frac{M^U}{N_j + M^U} = \frac{\lambda}{\eta-1} (M^U)^{\eta-1} \quad (4.3.2)$$

The effect of cooperation in immigration policies, which is captured by the change in the number of foreign workers admitted in country  $j$ , can be shown by comparing  $M^N$  and  $M^U$  which are solutions to equation (4.3.1) and (4.3.2) respectively.

Taking logs on both sides of equations (4.3.1) and (4.3.2), we obtain the following equations after some rearrangement:

$$(1+\alpha)\ln(N_j + M^N) + (\eta-2)\ln M^N = A$$

and,

$$(1 + \alpha) \ln(N_j + M^U) + (\eta - 2) \ln M^U = A - \ln \lambda$$

where,  $A \equiv \ln \alpha + \ln(1 - \alpha) + \ln(\eta - 1) + \alpha \ln H_j$ .

According to the assumption we have made ( $0 < \lambda < 1$ ) and properties of log function, we can easily show that

$$(1 + \alpha) \ln(N_j + M^U) + (\eta - 2) \ln M^U > (1 + \alpha) \ln(N_j + M^N) + (\eta - 2) \ln M^N$$

And due to the assumption  $\eta > 2$ , it could be easily proved that

$$M^U > M^N$$

which means that the optimal number of migrants who are accepted will be larger if receiving countries cooperate with each other in terms of immigration policies.

Intuitively, the social planners of receiving countries separately choose an optimal number of immigrants who are allowed to enter the country as to maximize the net aggregate welfare, given a “sufficiently convex” cost function of immigration. It turns out, the number of immigrants accepted in the non-cooperative equilibrium is suboptimally low due to the spillovers of migrants admitted by the counterpart. When the receiving countries hand over immigration control to a supranational organization, like the EU, the spillovers are internalized and therefore the optimal number maximizing the combined welfare is larger than the Nash equilibrium.

### 4.3.2 Individual attitudes towards centralization

Recall that we assume that each native  $i$  in destination  $j$  supplies one unit of “raw” labor and  $h_i$  units of human capital. The earnings of native  $i$  can therefore be written as ( $j$  is omitted since two receiving countries are identical):

$$I_i = f(h) - hf'(h) + h_i f'(h) = f(h) + (h_i - h)f'(h)$$

Individuals use their income to purchase the final good and have a linear utility function in consumption.

When confronted with a proposal of Europeanization of immigration policies, a citizen of country  $j$  will compare the status quo (which will be indicated with superscript 0) with the hypothetical situation that would arise if the initiative were accepted (superscript 1). Under the assumption of unskilled immigration, centralization of immigration policies will decrease the average human capital in receiving countries, that is  $h^1 < h^0$ .

In terms of a native's earnings, the difference between the two situations can be written as follows:

$$\Delta I_i = I_i^1 - I_i^0 = [f(h^1) - h^1 f'(h^1)] - [f(h^0) - h^0 f'(h^0)] + h_i [f'(h^1) - f'(h^0)]$$

or in a more compact form,

$$\Delta I_i = (\omega^1 - \omega^0) + (r^1 - r^0)h_i$$

In this case, the difference of income for a native  $i$ ,  $\Delta I_i$ , consists of two terms: the first is the reduction in wage income of one unit "raw" labor; and the second is the increase in human capital returns, which is linear in her endowment of human capital.

Assuming a Cobb-Douglas production function, the difference in wage income is negative,

$$\omega^1 - \omega^0 = (1 - \alpha)[(h^1)^\alpha - (h^0)^\alpha] < 0$$

and, the change in returns on human capital is positive,

$$r^1 - r^0 = \alpha[(h^1)^{\alpha-1} - (h^0)^{\alpha-1}] > 0$$

If we plot the difference in income,  $\Delta I_i$ , against individual's human capital endowment,  $h_i$ , as in Figure 4.1, we will see a strictly-upward straight line which crosses the x-axis once and only once. This implies that there exists at least one native, with human capital  $h^*$ , whose loss in wage in-

come of “raw labor” is completely compensated by the benefit resulting from the increase in human capital return. In this case, the marginal native is indifferent between the status quo and the hypothetical situation (i.e. Europeanization of immigration policy). Since the difference in individual’s total income is increasing with human capital endowment, those individuals whose human capital stock exceed the marginal level,  $h^*$ , will benefit from the centralization of immigration policies; while the others are likely to lose.

We assume the marginal natives will support the initiative, and define a dummy variable where a person is given a value of 1 if they are in favor of the initiative and 0 otherwise. Therefore, the attitudes of natives in destination countries could be described as follows:

$$procomimmi = \begin{cases} 0 & \text{if } h_i < h^* \\ 1 & \text{if } h_i \geq h^* \end{cases} \quad (4.3.3)$$

In summary, the expected change in income from the centralized immigration policy is a linear function of an individual’s human capital endowment. All individuals with human capital stock below the marginal level  $h^*$ , have a lower income under the hypothetical situation, and thus vote against the initiative. For those individuals with human capital stock above the marginal level, the higher is the human capital endowment, the greater is the benefits he will obtain, and thus the higher is the probability he will support the initiative.

## 4.4 Data and Summary Statistics

We draw on several waves of Eurobarometer surveys for the period 2000 - 2008 (Eurobarometer 54.1, 56.2, 58.1, 59.1, 62.0, 64.2, 66.1, 67.2, and 69.2) to empirically investigate citizens’ attitudes towards transferring competences from a national government to the EU institutions in the domain of immigration policy.

The Eurobarometer survey series was introduced by the European Commission in 1973 and since then surveys have been held twice a year in all

member countries. The Standard Eurobarometer polls ask for attitudes towards European unification, institutions and policies, complemented by measurements for general socio-political orientations, as well as for respondent and household demographics. Standard Eurobarometer samples were initially drawn among the national population, aged 15 and over, and its regular sample size is approximately 1000 respondents per country, except for small countries like Luxembourg or Malta. Starting with Eurobarometer 32 (October 1989) the basic sampling design in all member states is a multi-stage, probability one, and a post-stratification weighting procedure is employed in each of the participating countries. It is noteworthy that for each Standard Eurobarometer survey new and independent samples are drawn; and therefore, our data set enjoys a pooled cross-sectional structure.<sup>2</sup>

To construct a measure of supporting Europeanization of immigration policies, we use respondents' answers in the EB survey to the questions about whether they prefer political decisions in selected policy areas at the "EU-level" or "national level". The specific wording of the question is as follow:

*"For each of the following areas, do you think that decisions should be made by the (NATIONALITY) Government, or made jointly within the European Union?"*

The survey format also allows for "don't know (DK)" responses, which we treat as missing values and thus exclude from the sample in our specifications. As we can see in Figure 4.1, which displays the percentage of individuals who are in favor of delegating authority to the EU in the field of migration policy, the fraction of "DK" is small enough to be ignored and does not vary substantially across countries. Based on answers to this question, we construct our dependent variable, *procomimmi dummy*, which is dichotomous variable equals 1 for respondents who prefer "jointly within the EU" and 0 otherwise.

Empirical labor economists commonly measure human capital or skills via educational attainment or occupation classification. In this study we

<sup>2</sup>For more information about Eurobarometer, please refer to the official website.

employ years of education as the key independent variable to test the labor market predictions of the model. More specifically, we use answers to the question - “*How old are you when you stopped full-time education?*”. We trim the data to the range of (6, 32), implying a range of 0 to 26 years of education.

In the robustness check, we also examine whether or not the image of EU plays an independent role in citizens’ feelings towards immigration policy harmonization. In Eurobarometer surveys, there are a series of questions asking respondents’ perception on their country’s membership of the EU, such as “*Generally speaking, do you think that (OUR COUNTRY)’s membership of the European Union is...*”. Opinions from respondents’ are measured on a scale from 1 = *a bad thing* and 3 = *a good thing*.

We also constructed a dichotomous variables, *TRUSTEU*, based on answers to these questions - “*For each of the following European bodies, please tell me if you tend to trust it or tend not to trust it?*”. More specifically, we selected four most important European bodies, that is the European Parliament, the European Commission, the Council of Ministers of the European Union, and the European Central Bank. The dummy variable, *TRUSTEU*, equals one if respondents trust at least three of them and zero otherwise.

The Eurobarometer data includes also information on a number of individual-level characteristics defining the socio-economic background of each respondents, for example, the age, gender, political affiliation and religion. We take into account the self-reported right partisan political orientation of each respondent (measured on a scale from 1=left to 10=right), to capture the effect of political affiliation on natives’ attitudes towards a common immigration policy.

Finally, it is worth noting that the sample is restricted to native respondents in each country, since we are interested in attitudes of natives towards centralization of immigration policies. Respondents who did not answer questions as to their nationality, age or sex are also removed from the sample. The remaining sample of citizens of the European Union included in our sample is 103,221.

The summary statistics of the dependent variable, *procomimmi dummy*, and all the other control variables used in empirical analysis are presented in Table 4.1. As shown in Table 4.1, for the remaining sample, the average age when stopping full-time education is 18, i.e. on average our respondents have completed 12 years of education. Regarding EU citizens' support to European integration in general, nearly 60 percent of EU citizens show their preferences over common policies decided by the EU institutions.

For the whole sample, on average support for integration is only marginally higher than opposition on it (the arithmetic mean of *procomimmi dummy* is 0.55 in Table 4.1). But this figure hides a high degree of heterogeneity from country to country, which can be clearly seen in Figure 4.2. Less than half of the EU-15 countries support the harmonization of immigration policies, and clearly those new destination countries such as Italy and Spain apparently show greater support to this propose. Italy and Finland stands for two extreme cases, where in Italy, nearly 70% of the natives prefer to grant more power to the EU institutions, whereas only 20% citizens in Finland support Europeanization of immigration policy. On the other hand, centralization of immigration policies is widely welcomed in new member states (NMS), which can be seen in Figure 4.3. Except in Estonia, the fraction of citizens who support a common immigration policy is as high as 60 percent in all the other countries. In particular, more than 70 percent of the natives in Malta show preferences for granting competences to the EU institutions.

In addition, we examine the trends of support for centralization of immigration policies over time in each member country. Overall, most countries show a slight increase of support for the centralization of immigration policy, with the exception of Greece. The support for delegating EU-decided immigration policy in Greece peaked around year 2001, and kept declining after that. Interestingly, the fraction of natives showing preference over a common immigration policy in Germany West has been increasing since 2000, which is contrary to the deep impression that Germany have been insisting on a "national veto" on the numbers of immigrants admitted. Another surprising result is that we do not find any evident discontinuing jump in

year 2004, when 10 new member states joined the EU. In those new member states, although the propose of a EU immigration policy is widely supported, there are quite large fluctuations over time in some countries, for instance, in Czech Republic, Hungary and Latvia.

## 4.5 Benchmark Regression

To assess more systematically the determinants of individuals' preferences over delegating competences to EU on immigration, we estimate a simple probit model. The probability of supporting Europeanization of immigration policy serves as the dependent variables, and education levels and other demographic characteristics are included as explanatory variables. We also include destination countries' fixed effects, to account for the impact of unobserved country-specific effects, and year fixed effects, to account for common year specific shocks. In all specifications we use robust standard errors clustered by country, to address heteroskedasticity and allow for correlation across individual observations within the same country. Specifically, we estimate the following probit model:

$$Prob(procomimm_{ict} = 1|x_{ict}) = \Phi(\alpha + \beta edu_{ict} + \gamma X_{ict} + c_j + y_t + \epsilon_{ijt}) \quad (4.5.1)$$

where  $\Phi$  represents the cumulative distribution function of a standard normal,  $\beta$  is the parameter of interest, capturing the effect of education on preferences over harmonization of immigration policies.  $X_{ict}$  is the vector of all other control variables specific to individual  $i$  who is from country  $c$ , and  $\gamma$  is a vector of parameters to be estimated.

The overall analysis estimates the degree to which education and other explanatory variables have an effect on the probability that an EU resident will support a Brussels-controlled immigration policy, all other things being equal. Table 4.3 displays results of our initial set of regressions where we assume a common coefficient on individual-level variables across countries, based on the sub-sample of EU-15. The results are generally consistent with the theoretical predictions and in accordance with former results presented

in the literature.

In column (1) of Table 4.3, we present results of the most basic regression only with years of education, age and female as control variables. *Ceteris paribus*, in the EU-15 respondents' age is negatively associated with the probability of supporting centralization of immigration policy. Although not statistically significant, females are less likely to favor immigration policy integration, which is consistent with predictions since women respondents tend to have lower skill levels than men, on average, in the European economies.

The relationship we are interested in is the one between education and the individual attitudes towards Europeanization of immigration policy. The estimated coefficient on education indicates that higher educational attainments are associated with a statistically significant increase in the probability of displaying positive attitudes towards granting more power to the EU, with everything else held constant. More specifically, a one unit increase in the (number of) years of education, increases the likelihood that an individual favors immigration policy integration by 3 percentage points, after controlling country and year fixed effects.

In column (2) of Table 4.3, we repeat regression with an additional predictor, i.e. the self-reported left-right placement. The far-right parties in Europe have typically been the most vocal opponents of immigration, thus belonging politically to the Right leads to a preference for the nation-state to control immigration, while those on the Left will be more likely to support the harmonization of immigration policy. The regression result shows that people who are more politically conservative are indeed more likely to oppose the centralization of immigration policies in general. More precisely, one unit shift to the right on the left-right ideological dimension is associated with a 2.3 percentage points reduction in the likelihood that a respondent is would like to give up national control over immigration.

Results of regression with type of community included is reported in column (3) of Table 4.3. We take into account the region of residence because the previous literature has shown that individuals in rural are more

conservative and thus more likely to support restrictive immigration policies than those in urban and suburban communities. As in line with previous literatures, our regression result shows that individuals living in a middle or large town are more likely to favor immigration policy integration compared to those living in rural or a small town (i.e. the reference group). However, the effects are not statistically significant.

Furthermore, we augment our basic specification by adding two more regressors to test if individuals' attitudes towards Europeanization of immigration policies is related with their general perception on EU integration. The regression results are reported at the last column of Table 4.3. As it turns out, the point estimates on these two newly-added control variables are positive and significant at 0.1% confidence level. The probability of supporting the harmonization of immigration policy is higher for those EU citizens who believe that their country's membership of the EU is "*a good thing*" and for those who in general show higher trust to the EU institutions.

When controlling additional predictors, the estimated coefficient on education become smaller in magnitude, however it remains statistically significant in all the regressions. These evidences confirm our hypothesis that education, as a proxy for human capital, plays an essential role in shaping individuals attitudes towards an EU immigration policy.

To summarize, for the sub-sample of EU-15 countries, the regression results are quite supportive of the labor-market competition predictions, and in line with results from previous literature. In particular, our initial results reveal that, on average, in the sample of countries considered, there exists a positive and statistically significant correlation between individuals' skill, measured as years of education, and their preferences over assigning more powers to the EU institutions in the immigration policy area.

## 4.6 Robustness Checks

We first check the robustness of our results by adding the ten new member states who joined in EU in year 2004 into our sample. Many researchers have found that the timing of entry, the length of EU membership, and

national economic conditions are important determinants of support in favor of European integration. Therefore, we re-run the regressions, based on the whole sample, to check whether or not there also exist a strong positive correlation between natives' education level and their support to an EU immigration policy among new member states. It is worthy noting that the data for NMS-10 are only available starting in 2004.

The regression results are reported in Table 4.4. As we can see, though still significant, the point estimates of education is smaller in the absolute value, and even smaller when we controlling for respondents' general perception of the EU in the last column of Table 4.4. These results indicate that in those new member states, the link between years of education and supporting a common immigration policy is not as strong as in the EU-15 member states. One possible explanation for this phenomenon is that natives in new member states are relatively low-skilled compared to natives in more economically advanced EU-15 member countries. The large share of unskilled natives in new members states are more likely to oppose the Europeanization of immigration policy if they correctly realize that an EU immigration policy is likely to increase the inflows of unskilled foreign workers.

The negative relationship between respondents' age and probability of supporting immigration policy integration becomes stronger when it comes to the new member states. Other socio-demographic characteristics, such as gender and type of residence, seem not to play a systematic role across new member countries neither, since point estimates are found to vary in sign as well as in significance.

The same patten as before has been observed regarding the relationship between political orientation and the support to an EU immigration policy. The results in Table 4.4 show that the more rightist the position of a native on the left-right ideological dimension, the more likely it is that he will vote against handing over immigration control to the the EU organizations. We also find evidence that natives' general perception of the EU continues to play an important role in determining their attitudes towards an centralized immigration policy. People who believes that their country benefited from

the EU membership and trust the EU institutions are more likely to support granting more power to the EU organization in the field of immigration.

So far, we assume that the coefficients on individual-level control variables are the same across the countries. In fact, EU member countries vary widely in various aspects, such as the labor market and immigration situation, therefore one might not expect the education level to be equally salient in all EU member states as far as national control over immigration policy is concerned. To understand this cross-national variation in a comparative sense, we now turn to a 15-nation comparative model that will test the impact of explanatory variables on the likelihood of supporting the Europeanization of immigration policy, in each of the EU member states as a separate sample.

The probit regression coefficients for the control variables, in each country as a separate sample, are displayed in Table 4.5 and Table 4.6 for EU-15 member states. As is clear from these two tables, it appears that years of education is a relatively stable and consistent predictor of feelings towards EU immigration policy across most EU-15 member states. The most dramatic results are in Belgium, Denmark and UK, where a one unit increase in the years of education leads to a above 3-point percent increase in the odds of preferring immigration decisions to be made jointly within EU. On the other hand, the results show there is no significant impact of education on such preferences in Luxembourg and Portugal.

However, education is not the only significant predictor of opinion about immigration policy harmonization in the EU, as the tables reflect. There are other factors that are driving the attitudes towards a Brussels-controlled immigration policy. The point coefficients on EU MEMBERSHIP and TRUSTEU are also positive and statistically significant in all the probit regressions, indicating that citizens' overall opinion about the EU also plays an important role in shaping their attitudes towards the centralization of immigration policy.

## 4.7 Conclusions

Immigration policy is a very controversial topic which poses a challenge for the EU and the member states, a thorough analysis is very important to understand the development that have happened so far and meanwhile to be able to successfully predict possible changes in the future. A “race-to-the top” phenomenon in restrictive immigration policies has been observed recently in Europe because of lack of cooperation among destination countries and cooperation between receiving and sending countries. A supranationalized common EU immigration policy, though considered as an effective way to rectify this problem, has not formulated yet.

In this paper, we have developed a simple theoretical framework to study the impact of skills, measured as years of education, on individuals’ attitudes towards establishing a harmonized immigration policy. In particular, we have shown that delegating competences to the EU in the field of immigration is likely to lead to a more liberal policy for unskilled immigrants. Unskilled natives in destination countries thus prefer national control over immigration policy because they are fear of competition brought by a larger inflows of unskilled foreign workers. In other words, EU citizens’ education level are positively correlated with their support to the harmonization of immigration policy.

Using various waves of Eurobarometer surveys, we have brought the predictions of the model to the data. The regression results of simple probit models are consistent with the labor-market competition model, showing that there is a strong positive relationship between individuals’ education levels and their attitudes on this issue. The results remain robustness even when we controlling for some additional explanatory variables. In addition, it appears that years of education is a relatively stable and consistent predictor of feelings towards EU immigration policy across most EU-15 member states, when it comes to cross-country variations in preferences.

Nevertheless, our analysis are of great interest given the importance of the immigration issue throughout Europe, and provides some grounds for building a common immigration policy. While contributing to a better un-

derstanding of the roots of different public opinions on common immigration policy, the results also have immediate implications for policy makers if they are to ensure that a common immigration policy received widespread acceptance. Economic considerations contribute to opinions on migration issues, thus policies related to labor market security and welfare spending may have important effects on public resistance towards further immigration. Furthermore, education policies are clearly necessary, from both an economic and non-economic points of review. Promoting knowledge of EU institutions and a culture of tolerance can be very effective in shaping attitudes towards EU integration, especially in the domain of immigration policy.



# References

- [1] Alesina, A., I. Angeloni, and L. Schuknecht (2005). What does the European Union do? *Public choice* 123, 275-319.
- [2] Alesina, A, and E. Spolaore (2003). The size of nations. MIT Press, Cambridge, MA.
- [3] Ahrens, J., M. Meurers, and C. Renner (2008). Who shall decide what? Citizens' attitudes towards political decision making in the EU. In Gelauff, G., I. Grilo, and A. Lejour. (Eds), *Subsidiarity and Economic Reform in Europe*. Springer, Berlin, pp- 41-58.
- [4] Ahrens J., M. Meurers and C. Renner (2007). Beyond the big-bang enlargement: Citizens' preferences and the problem of EU decision making. *European Integration* 29, 447-479.
- [5] Benhabib J. (1995). On the political economy of immigration. *European Economic Review* 40, 1737-1743.
- [6] Boeri T. and H. Brucker (2005). Why are Europeans getting so tough on migrants?. *Economic Policy* 20, 629-703.
- [7] Boeri T. and H. Brucker (2005). Migration, coordination failures and EU Enlargement. IZA DP No. 1600.
- [8] Borjas, G. J. (1999). The economic analysis of immigration. In O. C. Ashenfelter and D. Card (Eds.), *Handbook of labor economics*, pp. 1697-1760. Amsterdam: North-Holland

- [9] Card D., C. Dustmann and I. Preston (2005). Understanding attitudes to immigration: The migration and minority module of the first European social survey. CReAM Discussion Paper No. 03/05.
- [10] Cerniglia F. and L. Pagani (2009). The European Union and the member states: An empirical analysis of Europeans' preferences for competence allocation. *CESifo Economic Studies* 55, 197-232.
- [11] Citrin, J., D. Green, C. Muste, and C. Wong (1997). Public opinion towards immigration reform: the role of economic motivations. *Journal of Politics* 59, 858-881
- [12] Dustmann C. and I. Preston (2004). Racial and economic factors in attitudes to immigration. CReAM Discussion Paper No. 01/04.
- [13] Facchini, G. and A. M. Mayda (2008). From individual attitudes towards migrants to migration policy outcomes: Theory and Evidence. *Economic Policy* 56, 651-713.
- [14] Facchini, G. and A. M Mayda (2009). Does the welfare state affect individual attitudes towards immigrants? Evidence across countries. *The Review of Economics and Statistics* 91(2), 295-314
- [15] Facchini, G., O. Lorz and G. Willmann (2006). Asylum seekers in Europe: The warm glow of a hot potato. *Journal of Population Economics* 19, 411-430.
- [16] Fetzer, J. (2000). Public attitudes toward immigration in the United States, France and Germany. Cambridge: Cambridge University Press.
- [17] Gabel M. (1998). Public support for European Integration: An empirical test of five theories. *the Journal of Politics* 60, 333-354.
- [18] Giordani P. and M. Ruta (2009). The immigration policy puzzle. MPRA paper No. 23584.
- [19] Hainmueller, J. and M. J. Hiscox (2007). Educated preferences: Explaining attitudes toward immigration in Europe. *International Organization* 61, 399-442.

- [20] Hainmueller, J. and M. J. Hiscox (2008). Attitudes towards highly skilled and low skilled immigration: Evidence from a survey experiment. Mimeo, Harvard.
- [21] Hanson, G. H., K. Scheve, and M. Slaughter (2007). Public finance and individual preferences over globalization strategies. *Economics and Politics* 19, 1-33.
- [22] Kentmen C. (2010). Bases of support for the EU's common foreign and security policy: Gender, attitudes toward economic integration, and attachment to Europe. *International Political Science Review* 31, 285-299.
- [23] Kessler A. E. and G. P. Freeman (2005). Public opinion in the EU on immigration from outside the community. *Journal of Common Market Studies* 43, 825-850.
- [24] Luedtke A. (2005). European integration, public opinion and immigration policy: Testing the impact of national identity. *European Union Politics* 6, 83-112.
- [25] Mayda, A. M (2006). Who is against immigration? A cross-country investigation of individual attitudes toward immigrants. *Review of Economic and Statistics* 88, 510-530
- [26] Moller N. M., J. R. Munch, S. Schroll and J.R. Skaksen (2009). Explaining cross-country differences in attitudes towards immigration in the EU-15. *Soc Indic Res* 91, 371-390.
- [27] O'Rourke, K. H. and R. Sinnott (2004). The determinants of individual attitudes towards immigration. *European Journal of Political Economy* 22, 838-861.
- [28] Scheve, K. F. and M. J. Slaughter (2001). Labor market competition and individual preferences over immigration policy. *Review of Economics and Statistics* 83, 133-145.

Figure 4.1: Relationship between human capital and changes in income

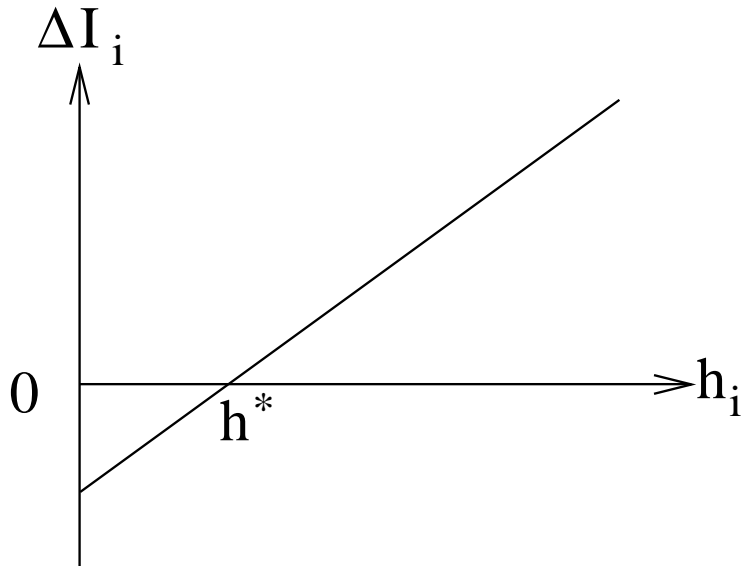


Figure 4.2: Fraction of favoring an EU immigration policy over 2000-08 (EU-15)

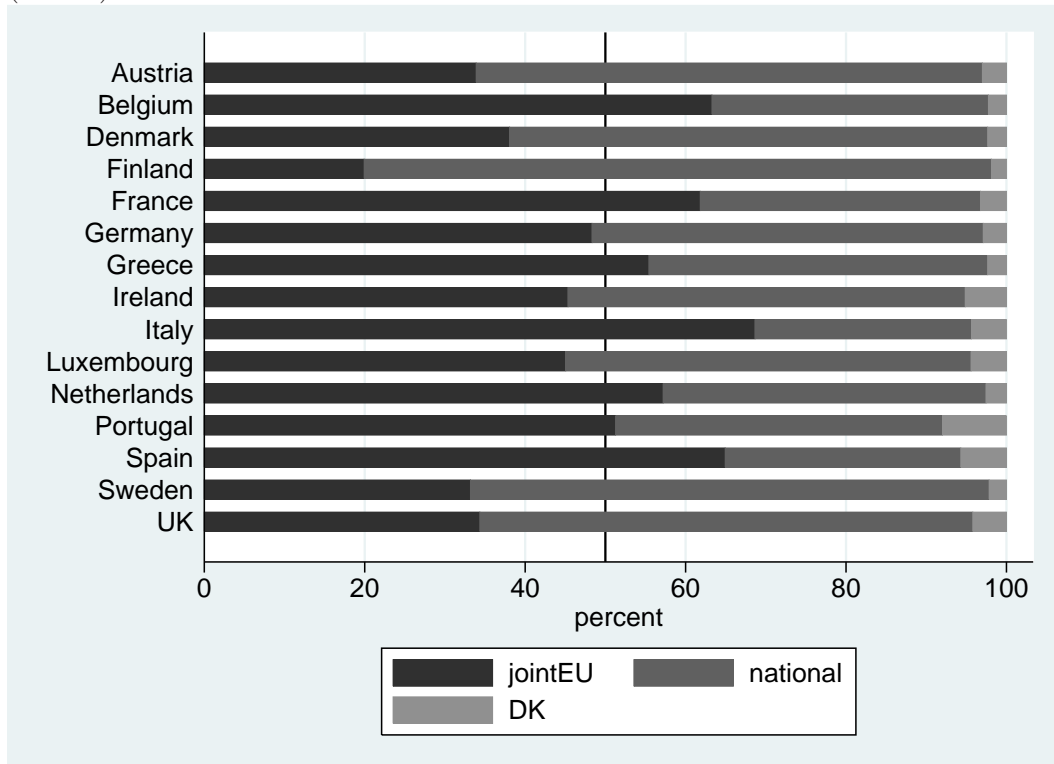


Figure 4.3: Fraction of favoring an EU immigration policy over 2004-08 (NMS-10)

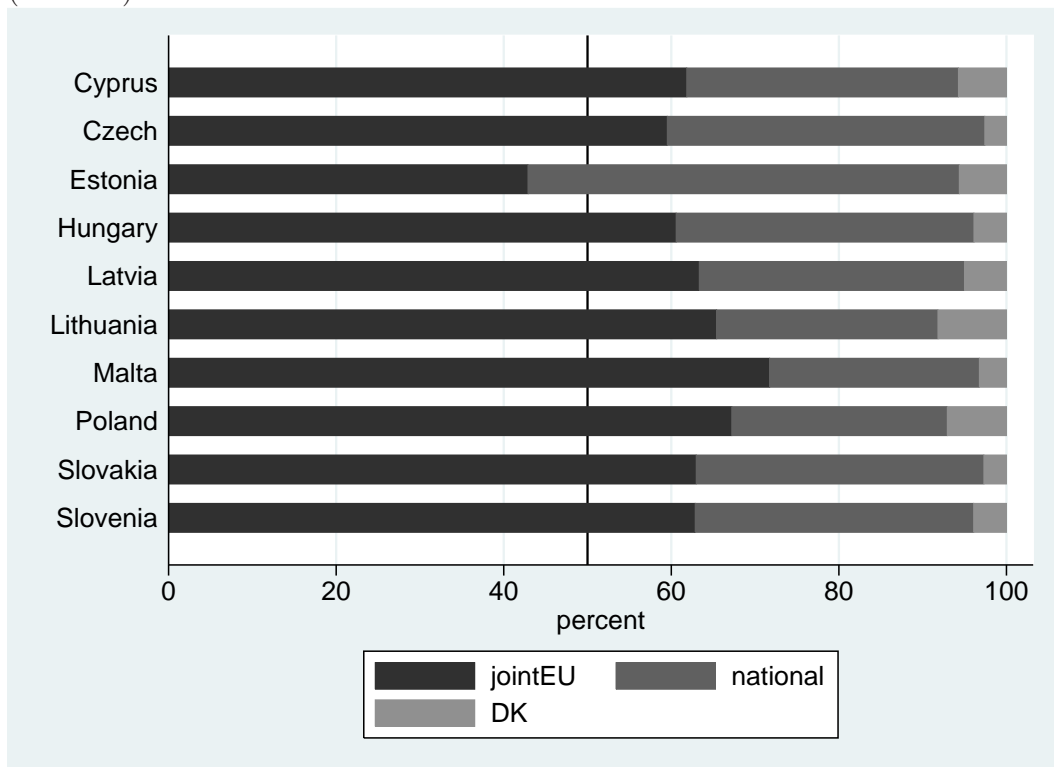


Figure 4.4: Individuals' attitudes to an EU immigration policy over time

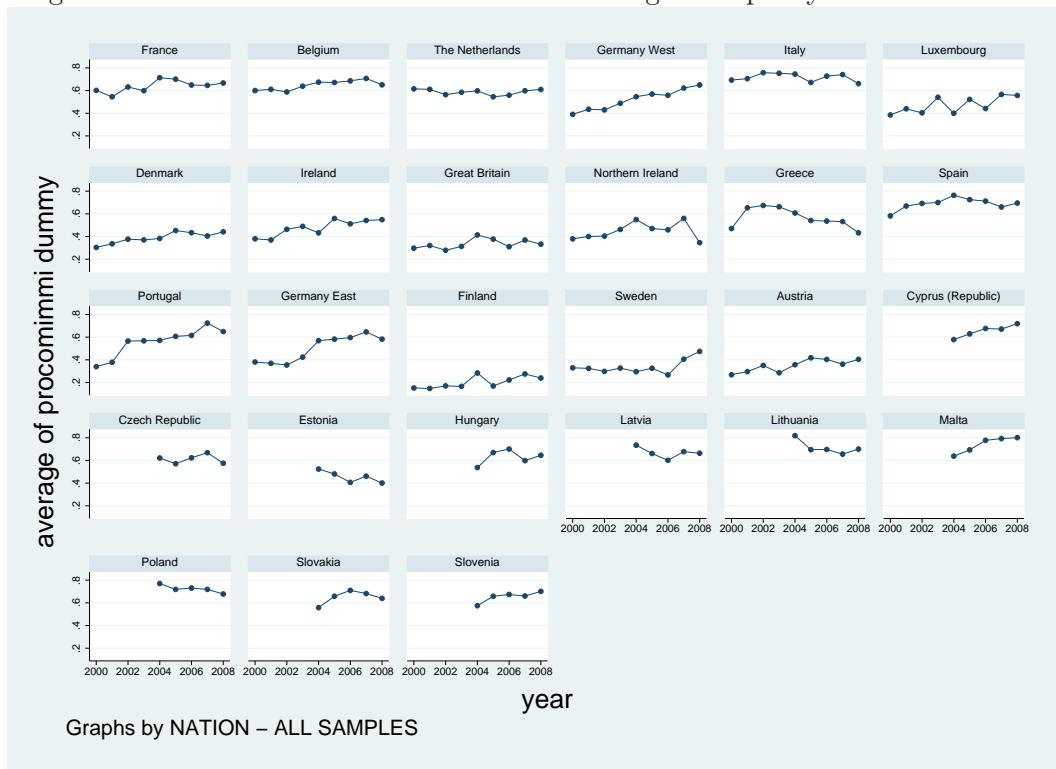


Table 4.1: Summary statistics of individual-level variables

Variable	Mean	Std. Dev.	Min.	Max.	N
year	2004.507	2.493	2000	2008	123636
country	12.454	7.893	1	28	123636
comimmi	1.534	0.499	1	2	123636
procomimmi	0.534	0.499	0	1	123636
edu	18.374	4.1	6	32	123636
age	49.365	16.548	0	99	123636
community	1.91	0.787	1	3	113587
female	0.521	0.5	0	1	123636
lrwing	5.344	2.103	1	10	123636
membership	1.568	0.722	1	3	123636
trustparliament	1.517	0.704	1	3	123636
trustcommission	1.602	0.752	1	3	123636
trustcouncil	1.732	0.809	1	3	123636
trustECB	1.633	0.795	1	3	123636
trustEU	0.48	0.5	0	1	123636
crime	1.708	0.47	1	3	123636
comdefence	1.605	0.522	1	3	123636
environment	1.671	0.487	1	3	123636
regionsupport	1.701	0.5	1	3	123636
procentral	0.585	0.493	0	1	123636

Table 4.2: Summary statistics of individual-level variables by country (mean values)

<b>Country</b>	<b>Procomimmi</b>	<b>Edu</b>	<b>Age</b>	<b>lrwing</b>	<b>trustEU</b>
France	0.65	18.67	47.98	4.96	0.43
Belgium	0.65	18.75	48.88	5.16	0.55
The Netherlands	0.60	19.46	49.30	5.18	0.45
Germany West	0.54	18.03	50.70	5.28	0.39
Italy	0.73	17.95	46.67	5.14	0.57
Luxembourg	0.47	18.81	50.71	5.37	0.58
Denmark	0.38	21.89	50.58	5.70	0.45
Ireland	0.48	17.73	46.88	5.64	0.58
Great Britain	0.33	17.05	50.11	5.22	0.19
Northern Ireland	0.45	17.10	48.80	5.36	0.29
Greece	0.58	16.92	49.57	5.68	0.58
Spain	0.70	16.51	46.88	4.61	0.58
Portugal	0.57	14.36	48.45	5.14	0.60
Germany East	0.47	18.01	49.87	4.66	0.37
Finland	0.20	20.02	52.33	5.68	0.46
Sweden	0.35	20.36	51.30	5.41	0.38
Austria	0.36	17.83	46.78	5.19	0.40
Cyprus (Republic)	0.67	16.86	51.72	5.33	0.63
Czech Republic	0.62	18.74	48.47	5.70	0.48
Estonia	0.43	19.44	51.43	5.97	0.57
Hungary	0.64	17.11	51.43	5.52	0.57
Latvia	0.68	18.87	47.33	6.13	0.40
Lithuania	0.72	19.02	50.86	5.48	0.58
Malta	0.75	16.65	50.75	5.71	0.59
Poland	0.73	19.06	49.04	5.89	0.49
Slovakia	0.64	18.66	48.51	5.08	0.56
Slovenia	0.67	18.97	51.56	5.38	0.63
<b>Total</b>	<b>0.53</b>	<b>18.37</b>	<b>49.37</b>	<b>5.34</b>	<b>0.48</b>

Table 4.3: Determinants of Attitudes towards an EU Immigration Policy (EU-15)

	(1)	(2)	(3)	(4)
EDUCATION	0.0300*** (26.86)	0.0300*** (26.86)	0.0309*** (25.92)	0.0202*** (16.56)
AGE	-0.00101*** (-3.80)	-0.000796** (-2.97)	-0.000748** (-2.64)	-0.000747** (-2.60)
FEMALE	-0.0157 (-1.86)	-0.0185* (-2.19)	-0.0165 (-1.85)	0.0113 (1.24)
L/R PLACEMENT		-0.0233*** (-10.87)	-0.0223*** (-9.79)	-0.0275*** (-11.90)
MIDDLE TOWN			0.0141 (1.31)	0.00670 (0.62)
LARGE TOWN			0.00311 (0.27)	-0.0107 (-0.91)
EU MEMBERSHIP				0.322*** (46.66)
TRUSTEU				0.171*** (17.46)
Observations	94700	94700	84651	84651
Country / Year FEs	yes	yes	yes	yes

*t* statistics in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Dependent variable, *procomimmi dummy*, equals one if respondents prefer the immigration policy to be determined jointly within the EU and zero otherwise.

For definitions of control variables, please see section IV.

Table 4.4: Determinants of Attitudes towards Common Immigration Policy (EU15 + NMS10)

	(1)	(2)	(3)	(4)
EDUCATION	0.0271*** (26.59)	0.0271*** (26.62)	0.0277*** (25.65)	0.0176*** (15.89)
AGE	-0.00153*** (-6.54)	-0.00145*** (-6.19)	-0.00146*** (-6.00)	-0.00147*** (-5.97)
FEMALE	-0.00859 (-1.16)	-0.0100 (-1.35)	-0.00762 (-0.99)	0.0161* (2.05)
L/R PLACEMENT		-0.0133*** (-7.47)	-0.0119*** (-6.41)	-0.0191*** (-10.17)
MIDDLE TOWN			0.00286 (0.31)	-0.00792 (-0.85)
LARGE TOWN			-0.00347 (-0.34)	-0.0230* (-2.26)
EU MEMBERSHIP				0.295*** (48.93)
TRUSTEU				0.175*** (20.76)
Observations	123636	123636	113587	113587
Country / Year FEs	yes	yes	yes	yes

*t* statistics in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Dependent variable, *procomimmi dummy*, equals one if respondents prefer the immigration policy to be determined jointly within the EU and zero otherwise.

For definitions of control variables, please see section IV.

Table 4.5: Determinants of attitudes to common immi policy in each country (EU-15)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FR	BE	NL	DE	IT	LU	DK
EDUCATION	0.0294*** (5.40)	0.0362*** (6.04)	0.0210*** (4.96)	0.0169*** (4.92)	0.0149** (2.97)	0.0130 (1.69)	0.0354*** (8.62)
AGE	0.000678 (0.61)	0.00235* (2.05)	0.00108 (0.98)	0.00141 (1.83)	0.00221 (1.47)	0.000455 (0.26)	-0.000613 (-0.57)
FEMALE	-0.0476 (-1.37)	-0.0395 (-1.12)	-0.0144 (-0.45)	0.0768** (2.99)	-0.0143 (-0.34)	0.0624 (1.16)	-0.0248 (-0.70)
L/R PLACEMENT	-0.0466*** (-5.41)	-0.0267** (-2.88)	-0.0275** (-3.25)	-0.0314*** (-4.26)	-0.0301*** (-3.66)	-0.0676*** (-4.75)	-0.0543*** (-6.08)
MIDDLE TOWN	-0.0199 (-0.50)	-0.0690 (-1.72)	-0.0408 (-1.12)	0.0171 (0.55)	-0.0845 (-1.50)	0.0200 (0.35)	0.0502 (1.15)
LARGE TOWN	-0.0370 (-0.76)	-0.00547 (-0.11)	0.00782 (0.18)	0.0168 (0.49)	-0.130 (-1.96)	0.0554 (0.59)	0.124** (2.62)
EU MEMBERSHIP	0.345*** (13.87)	0.254*** (9.30)	0.315*** (12.34)	0.287*** (14.40)	0.229*** (7.28)	0.239*** (4.51)	0.416*** (15.06)
TRUSTEU	0.172*** (4.62)	0.173*** (4.70)	0.130*** (3.92)	0.145*** (5.26)	0.160*** (3.64)	0.0531 (0.94)	0.193*** (5.10)
Observations	5897	5592	6728	10105	4500	2298	5716

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Year fixed effects are included in all the regressions.

Table 4.6: Determinants of attitudes to common immi policy in each country (EU-15) continue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IE	UK	EL	ES	PT	FI	SE	AT
EDUCATION	0.0126 (1.80)	0.0311*** (5.58)	0.0155** (3.18)	0.0157** (2.91)	0.00621 (1.27)	0.0200*** (4.47)	0.0227*** (5.91)	0.0217*** (3.51)
AGE	-0.00212 (-1.75)	-0.00548*** (-5.84)	0.000828 (0.68)	-0.00145 (-1.11)	-0.00420*** (-3.33)	-0.00376** (-3.08)	0.000847 (0.77)	-0.00378** (-3.15)
FEMALE	-0.0670 (-1.84)	0.140*** (4.35)	-0.0342 (-0.92)	-0.00610 (-0.16)	0.0618 (1.63)	0.139*** (3.57)	-0.0777* (-2.17)	-0.00104 (-0.03)
L/R PLACEMENT	0.00236 (0.23)	-0.0659*** (-6.94)	0.00339 (0.42)	-0.0244* (-2.39)	0.0138 (1.44)	-0.0490*** (-4.87)	0.00369 (0.42)	-0.0175 (-1.82)
MIDDLE TOWN	0.0295 (0.56)	0.0447 (1.09)	-0.0151 (-0.27)	-0.0807 (-1.72)	0.00214 (0.05)	0.125** (2.74)	0.0631 (1.52)	-0.0542 (-1.19)
LARGE TOWN	-0.0790 (-1.94)	0.0120 (0.29)	0.0689 (1.62)	-0.189*** (-3.88)	-0.00190 (-0.04)	0.0588 (1.03)	0.0824 (1.71)	-0.0234 (-0.53)
EU MEMBERSHIP	0.248*** (7.08)	0.445*** (20.24)	0.317*** (10.31)	0.228*** (6.95)	0.158*** (5.71)	0.290*** (10.20)	0.384*** (15.67)	0.339*** (12.50)
TRUSTEU	0.214*** (5.54)	0.246*** (6.14)	0.313*** (7.60)	0.199*** (4.74)	0.192*** (4.67)	0.130** (3.20)	0.135*** (3.54)	0.210*** (5.24)
Observations	4924	7088	5167	4845	4802	5862	5789	5338

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Year fixed effects are included in all the regressions.