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International labour migration and its contribution to economic growth

- A case study of labour immigration to Canada

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Abstract

The aim of the thesis is to highlight the contribution to economic growth that is attributable to labour migration. Inflow of human capital in the form of international migration is a part of many contemporary economies. Yet, very few models of economic growth recognize migration, and especially labour migration, as a factor influencing economic growth. This thesis constructs a model of economic growth that includes the aspect of labour migration, which is referred to as the “labour immigration-augmented model of technological transfer”. The findings of the model are analysed in a case study of Canada, a country with a very active immigration policy that is specifically aimed at attracting skilled labour. The model and the case study find that the human capital in terms of formal education of labour immigrants to Canada is higher than the human capital of the Canadian-born population. Thus, the potential contribution to economic growth by labour immigrants to Canada is higher than the domestic equivalent. This thesis concludes that barriers to integration and the transferability of skills create a divergence between the potential and the actual contribution to economic growth by labour immigrants to Canada.

Key words: international migration, human capital, economic growth, labour immigration, Canada

Table of contents

1	Introduction.....	5
1.1	Research problem.....	5
1.2	Aim	6
1.3	Method	6
2	Theoretical framework.....	8
2.1	Theories of economic growth	8
2.1.1	The model of technological transfer	8
2.1.2	The labour immigration-augmented model of technological transfer	10
2.1.3	The labour immigration-augmented model of technological transfer in equation format.....	11
2.2	Theories of human capital.....	18
2.2.1	Human capital theory and migration	19
2.2.2	Positive selection among labour immigrants	20
2.2.3	The Roy model – negative selection.....	21
2.2.4	Asymmetric information – statistical discrimination.....	21
3	Case study of Canada	23
3.1	Labour immigration to Canada, an overview	23
3.1.1	Importance of economic immigrants for labour force growth.....	23
3.1.2	Economic class of immigration to Canada	24
3.1.3	Selection process through the point system.....	25
3.2	Characteristics of labour immigrants to Canada	27
3.2.1	Geographical origin	27
3.2.2	Education	28
3.2.3	Language skills	29
3.3	Labour immigrants’ effects on economic growth in Canada.....	29
3.3.1	Labour immigrants’ potential contribution to economic growth.....	29
3.3.2	Labour immigrants’ actual contribution to economic growth	30
3.3.3	Limitations of data	32
3.4	Possible reasons for the divergence between labour immigrants’ potential and actual contribution to economic growth.....	32
3.4.1	Recognition of credentials	33
3.4.2	Lack of Canadian experience.....	35
3.4.3	Geographical distribution of immigrants’ source countries	36
3.4.4	Language barriers	38
3.4.5	Taste discrimination.....	38
3.4.6	Other reasons	Fel! Bokmärket är inte definierat.
4	Summary and conclusion	40
5	Suggestions for further research	42
6	References.....	43

1 Introduction

1.1 Research problem

In our contemporary global society, the flow of labour across international boundaries is a natural element of many open nations. The in- and outflow of migrants, and especially labour migrants, is likely to affect the conditions and the growth of the economy. Despite the flexibility of the global labour market, little academic literature concerning models of economic growth highlights how labour migration affects the economic growth of a country. As labour migration is likely to impact the human capital composition of the economy, an important component is lost when neglecting the flow of skilled workers in models of economic growth. This thesis will construct a model of economic growth that includes the aspect of labour migration, and use the model to analyse the potential and actual contribution of labour immigration on the growth of the economy.

The model of economic growth that incorporates the aspects of labour migration, which will be developed in the thesis, will focus on countries that experience a net inflow of labour migration. The model will be constructed with the nation of Canada in mind, as Canada is a country with a very well defined and active immigration policy, with its unique point system as a selection tool of labour immigrants as one of its most distinguishing traits (see for example Alboim, Finnie and Meng; 2005, Reitz; 2005). Canada is a nation with long and extensive immigration traditions, dating back to the time when the country was colonized by the French and the English in the 17th century and onwards. Immigration is one of the most important foundations of the modern Canadian society, as, apart from the native population¹, all Canadians have immigrant ancestry. Together, Canadian-born and immigrants form a multicultural society where ethnic minorities maintain the traditions and customs of their country of origin. As the reliance of immigration is great in the Canadian economy, both historically and from a future perspective, with immigration gaining importance for labour

¹ The native population consists of North American Indians, Métis and Inuits, whom, according to the latest Census in 2001 consisted of approximately 976,000 people, or 3,3 % of the Canadian population, (Census 2001, Statistics Canada).

market growth primarily due to demographic factors of Canadians, it is a very interesting country to study. The situation of labour immigrants on the Canadian labour market will be analysed in the case study of Canada.

1.2 Aim

The aim of the thesis is to construct a model of economic growth that incorporates the aspect of labour immigration. The findings of the model will be applied on a case study of Canada, where the following questions will be analysed:

- What are the observable characteristics of the human capital of labour immigrants, in comparison to that of the Canadian-born population? In other words, what is the labour immigrants' *potential* contribution to economic growth in Canada?
- Does labour immigrants' potential contribution to growth of the Canadian economy differ from their *actual* contribution to growth?
- If a divergence between the potential and actual contribution to growth exists, what are the main possible reasons behind this situation?

1.3 Method

The remainder of the thesis will be divided into two main sections: The first section will discuss the theoretical framework of the thesis and will consist of theories regarding economic growth and human capital. The starting-point of the analysis will be a model of endogenous growth, developed by Easterly, King, Levine and Rebelo (1994), which consider human capital to be the engine of growth in the economy. This model will be extended into incorporating aspects of labour immigration, and the augmented model will form the basis of the forthcoming analysis in the case study of Canada through the perspective of economic growth. The model that will be constructed in the thesis will be referred to as the "labour immigration-augmented model of technological transfer".

The following definitions will be useful throughout the thesis: Labour migration, also known as "economic migration" will be interpreted according to the definition by Chiswick (2000):

“Economic migrants are those who move from one place of work and residence to another, either within a country or across international boundaries, primarily because of their economic opportunities, as distinct from refugees and those who move because of the migration decision of others (*tied movers*).” However, this thesis will only treat international migration. Human capital will primarily be defined as the formal education that the migrant possesses, as this is most easily measured. For the analysis, human capital will be divided into the individuals who possess high skills (primarily in terms of education) and those who possess lower skills. This distinction is made only in order to facilitate the economic analysis, and should not be seen as a value judgement regarding that some people should have a different personal value than others.

The theoretical framework precedes a case study of Canada, the second section of the thesis. Labour immigration to Canada will be analysed according to the findings regarding economic growth and human capital outlined in the theoretical framework. An overview of the situation of labour immigrants in Canada will be followed by an analysis of labour immigrants’ potential and actual contribution to economic growth in the host country, and reasons to why a divergence may exist between the two. The case study of Canada will be conducted as a qualitative literature review, where available literature on the situation of labour immigrants in Canada will be analysed. Data will be obtained from secondary sources, such as Statistics Canada and Citizenship and Immigration Canada, as well as data from the academic literature on the topic.

A summary and conclusion will, together with suggestions to further research within the area, complete the study.

2 Theoretical framework

2.1 Theories of economic growth

2.1.1 The model of technological transfer

Easterly, King, Levine and Rebelo (1994) have developed a theory of endogenous growth, which will serve as the basis of the forthcoming analysis of labour immigration to Canada and its contribution to economic growth. The model was further described by, among others; Jones (2002) and Weil (2005), and it will be referred to as “the model of technological transfer” throughout the thesis. This model will be extended to include aspects of labour immigration.

The model of technological transfer, as described by Easterly et al. (1994) and Jones (2002), rests upon the assumption that the technological frontier is universal and that ideas and innovations can float freely across nation borders (hence the name of the model). The frontier is defined as the most advanced capital good that the world has developed and learned to use up to a specific point in time. The level of human capital of the population in a specific country determines the extent to which the nation can take advantage of the available technology, and thus, the distance from the country’s skill level to the technological frontier. The level of the human capital is described as the number of intermediary, capital goods that the labour force has the skills to use. The model of technological transfer states that a person with higher human capital has the ability to use more advanced, or a greater number of, capital goods. The engine of growth in the model of technological transfer is not the innovation of new technologies, but to learn how to adopt already existing technology. Technological growth is assumed to be exogenous, and growing at a constant rate. Economic growth takes place when the level of human capital increases and the labour force learns to adopt more advanced technology that is already available throughout the world (Easterly et al; 1994, Jones; 2002).

Human capital is determined according to the years that the individual has spent educating him or herself. This includes both formal, academic education and informal education, such as apprenticeships and on-the-job training. Furthermore, an average measure of the quality of education in the specific country is included in the determination of the level of human capital. “Quality of education” could for example be measured according to the student-to-teacher ratio, or the educational budget (Weil; 2005).

According to the model of technological transfer, the cost of adopting new technology into the production process is the cost of increasing the skills of the human capital of the labour force in order to incorporate larger numbers of capital goods in the “skill-repertoire” (Jones; 2002). Although not specifically stated in the original model, these costs could be seen as both the direct costs of education and the foregone earnings from not taking part in the labour force. These costs are taken both by the individual and the society. However, an individual will most likely only choose to educate him or herself if the future returns to the education exceed the present costs.

When constructing a model in order to analyse the economic effects of labour immigration to Canada, the model of technological transfer will serve as a particularly useful basis due to its focus on human capital as the engine of growth in the economy. The inflow of labour migrants will alter the human capital composition of the Canadian economy, which can be expressed through the model of technological transfer. Several other factors can affect economic growth in a country, such as its geographical location or history of colonial heritage (Gallup et al; 1998). However, these factors are not affected by a contemporary inflow of labour immigrants, and thus, they are not relevant for this particular model. As the analysis will focus solely on the Canadian experience, there will not be a need to introduce other factors into the model with the purpose to make comparisons between countries. Today, when international trade is increasing, borders between nations are being opened up and communication is swift and advanced, it is also relevant to consider the technological frontier as universal and common to all countries. There is no need for every country to invent the wheel again and the technology that is adopted in one country is not very likely to originate completely from within the borders of that specific nation. Thus, the assumption of a universal technological frontier is also relevant to the forthcoming analysis.

Some parts of the model of technology transfer will be presented in equation format below, in section 2.1.3 on page 11. However, for a more complete demonstration of the model, readers are advised to consult Jones (2002).

2.1.2 The labour immigration-augmented model of technological transfer

With labour immigration, the country experiences an inflow of human capital. It is unlikely that this human capital has the exact same characteristics as the human capital of the domestic population. Thus, the first modification of the model of technological transfer will be to recognize that the human capital of a country consists of two components: the human capital of the domestic population and the human capital of the labour immigrants. In the model of technological transfer, human capital is measured as a combination of years in education and the overall quality of the education. In Canada, labour immigrants have, on average, a higher number of years in education and higher academic degrees than the Canadian-born population (Statistics Canada), which will be further discussed in the case study of Canada. Hence, it is assumed that labour immigrants possess higher human capital in terms of education than the average Canadian-born worker, and are thus believed to have the potential to make higher contribution to growth of the Canadian economy than the domestic population. This is also recognized by Kemnitz (2001): "Each native benefits from immigration if and only if the average immigrant possesses more capital than the average native. He is worse off precisely if the average immigrant is endowed with less capital than the average native."

It is difficult to determine a general value of the "quality of education" for labour immigrants due to the heterogeneous nature of the group. Economic policies of the country of origin, tuition fees and individual factors, such as health and the educational status of the parents determine the educational quality of immigrants (Rainey and Murova; 2004). As there are several complications involved in defining the "quality of education" of such a diverse and complex group as labour immigrants, this factor will be assumed to be, on average, equal to the quality of education of Canadians when constructing the extended model. Thus, the model's main factor that distinguishes the human capital of the average Canadian-born individual from the human capital of the average labour immigrant in Canada is the formal education.

Furthermore, in the augmented model, it is assumed that the labour immigrants' investment in human capital is taken in their countries of origin and that no additional investment in, for example, formal education is made in the host country once the migration has taken place. This implies that the country of destination receives a “windfall” inflow of human capital that can contribute to the growth of the economy without any major additional costs to the economy.

Labour immigrants arrive in Canada with extensive academic backgrounds and high skills. However, their actual contribution to economic growth in Canada will depend upon the extent to which their skills can be transferred to a Canadian context and how well the labour immigrants are able to integrate with their new host society. The time and effort needed to integrate depends both on the characteristics of the labour immigrants and the extent to which the host country welcomes and incorporates the immigrants into the society. Factors which could contribute to that labour immigrants are prevented from contributing to economic growth with their entire human capital could include language barriers, inefficiencies regarding recognition of foreign credentials, lack of integration with the host country's society and discrimination of foreigners, both at the workplace in particular and in the society in general (see for example Alboim et al.; 2005). Thus, the second modification of the existing model of technological transfer will be to recognize that the labour immigrants' actual contribution to economic growth in the host country depend on the extent to which their skills can be transferred to the host country and the integration with the new society.

The two above modifications will constitute the basis of the labour immigration-augmented model of technological transfer, and they will also constitute the framework for the coming analysis in the case study of Canada.

2.1.3 The labour immigration-augmented model of technological transfer in equation format

The model of technological transfer, as adopted by Jones (2002), states that output (Y) is produced according to the following production function:

$$Y=L^{1-\alpha} \int_{j=0}^h x_j \cdot dj \tag{1}$$

A homogenous good (Y) is produced in the economy using labour (L) and a number of intermediary, capital goods (x_j). The sum of all capital goods that the labour force uses determines the output in the economy. Throughout the thesis, capital letters represents denotations for the entire economy and lower-case letters represents per capita denotations.

The production function (1) can be rearranged into a more user-friendly format, in order to achieve the expression that will serve as the starting point for the modifications of the model: The integral (in (1)) represents the sum of all capital goods that are used within the economy. It is assumed that all capital goods are utilized in equal amounts. The human capital in the economy determines the number of capital goods that can be utilized in the production process. Thus, the total amount of capital (K) in the economy can be described as a function of the per capita human capital (h) and capital goods (x) (Jones; 2002):

$$K = h \cdot x \Leftrightarrow x = \frac{K}{h} \quad (2)$$

The above equation (2) can be inserted into the production function (1):

$$Y = L^{1-\alpha} \int_{j=0}^h \left(\frac{K}{h}\right)^\alpha dj \rightarrow Y = L^{1-\alpha} \left(h \left(\frac{K}{h}\right)^\alpha\right) \rightarrow Y = L^{1-\alpha} h K^\alpha h^{-\alpha} \rightarrow Y = L^{1-\alpha} h^{1-\alpha} K^\alpha \quad (3)$$

The equation (3) can be rearranged in order to reach a more tractable equation denoting the model of technological transfer:

$$Y = K^\alpha (hL)^{1-\alpha} \quad (4)$$

This equation (4), as described by Jones' model of technological transfer, will be modified according to the above assumptions regarding the characteristics of the human capital of labour immigrants. The first modification will be to recognize that the human capital of the labour immigrants has different characteristics than the human capital of the domestic population. The per capita human capital in Canada (h_T) consists of the average human capital of the Canadian-born population (h_c) and the average human capital of labour immigrants (h_{imm}) according to the following equation:

$$h_T = h_c h_{imm} \quad (5)$$

The equation (5) involves one limitation: if the country does not experience any human capital from immigrants whatsoever, the equation for total human capital in the country becomes zero. However, this situation is not very likely, especially not in the case of Canada, where approximately 18,4 % of the inhabitants are foreign-born according to the census of

2001² (Statistics Canada). In cases of a more general discussion regarding human capital of the domestic population and immigrants in the thesis, (h_c) will be used to denote the human capital of the domestic population.

Labour immigrants to Canada are more educated than the domestic population, and thus, the human capital of the immigrants is higher than that of the Canadian-born. In equation-format, it implies that:

$$\frac{h_{imm}}{h_c} > 1 \quad (6)$$

This equation will be utilized throughout the thesis to denote that labour immigrants to Canada have higher human capital, and thus higher potential contribution to economic growth, than the Canadian-born population. The greater the relationship in (6), the greater the potential contribution to economic growth by labour immigrants compared to the domestic population.

Secondly, the potential barriers that can affect the integration of immigrants must also be included in the model. In order to take this limiting aspect into account in the equations, the model of technological transfer will be extended with a factor, which will be referred to as β . β Denotes the extent to which labour immigrants can actually contribute to economic growth in the host country according to their full potential. β Can take values between 0 and 1, where $\beta=1$ represents a situation where labour immigrants can contribute to economic growth in the host country according to their true level of skills without any hindrance at all. $\beta=0$ denotes a scenario where absolutely no human capital of labour immigrants contributes to growth:

$$h_T = h_c h_{imm}^\beta, \quad 0 \leq \beta \leq 1 \quad (7)$$

The additions to the model can now be used in order to determine the effect of labour immigration on the growth rate of human capital and the growth rate of the economy in Canada. In Jones' model of technological transfer, change (which is denoted with a dot above the letter) in human capital occurs according to the following equation (Jones; 2002):

² The latest census was conducted in May 2006. However, at the time of writing, the results of the 2006 census were not yet published. Estimated release date of the data regarding immigration is December 2007. Censuses in Canada take place every 5th year.

$$\dot{h} = \mu e^{qu} A^\gamma h^{1-\gamma} \quad (8)$$

The skills of the human capital, and thus the number of capital goods that the population has sufficient skills to use, increases when the quality of education (μ and φ) and/or the years spent in education (u) increases and when the world technological frontier (A) expands. The value of the parameter γ determines the weight that is dedicated to (A) and (h) respectively.

In order to obtain the equation for human capital accumulation according to the labour immigration-augmented model of technological transfer, equation (7) must be combined with equation (8):

$$\dot{h}_T = \mu e^{qu} A^\gamma (h_c h_{imm}^\beta)^{1-\gamma} \quad (9)$$

In this labour immigration-augmented model of technological transfer, the total accumulation of human capital depends both on the human capital of the Canadian-born population and the human capital of labour immigrants. The transferability and integration of the human capital of labour immigrants is denoted with the factor β .

To obtain the growth rate of the human capital, the equation for \dot{h}_T (9) will be divided by the total human capital, h_T (7):

$$\frac{\dot{h}_T}{h_T} = \left(\mu e^{qu} A^\gamma (h_c h_{imm}^\beta)^{1-\gamma} \right) \frac{1}{h_T} = g_h = g \quad (10)$$

This equation can be rearranged into a more tractable format:

$$\frac{\dot{h}_T}{h_T} = \mu e^{qu} \left(\frac{A}{h_c h_{imm}^\beta} \right)^\gamma = g = g_c + \beta g_{imm} \Leftrightarrow \quad (11)$$

$$\Leftrightarrow \frac{g_c + \beta g_{imm}}{\mu e^{qu}} = \left(\frac{A}{h_c h_{imm}^\beta} \right)^\gamma \Leftrightarrow \left(\frac{h_c h_{imm}^\beta}{A} \right) = \left(\frac{\mu e^{qu}}{g_c + \beta g_{imm}} \right)^{1/\gamma} \Leftrightarrow \quad (12)$$

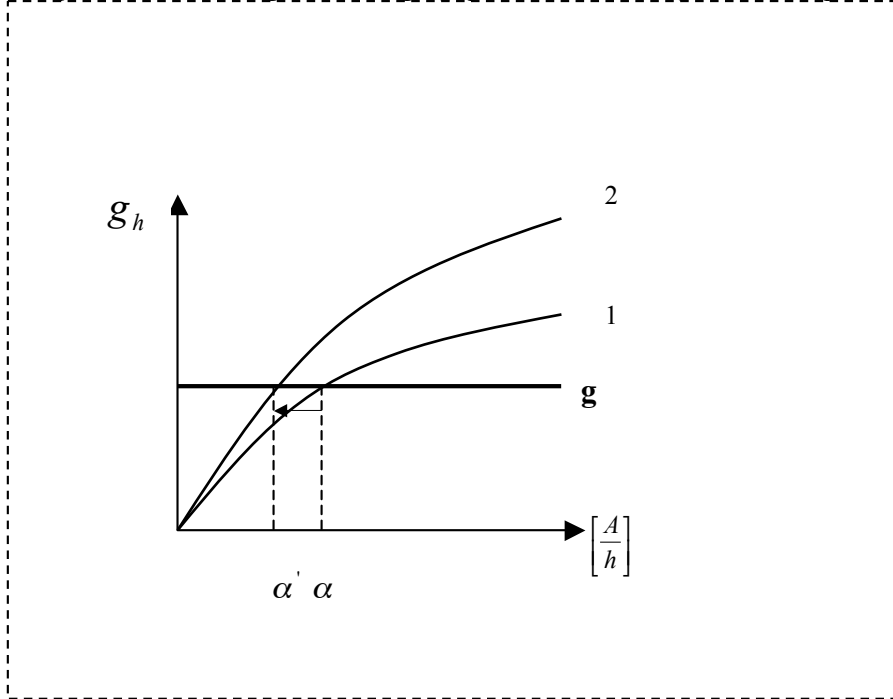
$$\Leftrightarrow h_c h_{imm}^\beta = \left(\frac{\mu e^{qu}}{g_c + \beta g_{imm}} \right)^{1/\gamma} A \quad (13)$$

The term $\left(\frac{A}{h_c h_{imm}^\beta} \right)$ in equation (11) denotes the “technology gap”, which determines how far the country is from the world technological frontier. The higher the gap, the further is the distance to the technology frontier. As the skills of the population increases and they learn how to adopt more advanced technology, the technology gap decreases.

Equation (13) denotes the growth rate of human capital in the labour immigration-augmented model of technological transfer. The model implies that the higher the human capital, the more advanced technology can be adapted, the higher the growth rate of labour input in production and the greater the output. Thus, growth in human capital translates into growth of the entire economy. From equation (13) it can be concluded that according to the labour immigration-augmented model of technological transfer, the growth rate of human capital (which implies growth rate of the economy) depends both on the growth rate of the human capital of the domestic population and the equivalent growth rate of labour immigrants. However, the growth rate of the labour immigrants' human capital is determined by the factor β , denoting the extent to which their human capital can be transferred to the context of the new host country and the integration of the labour immigrants. The higher the growth rate of human capital of labour immigrants, when controlling for the value of β , in relation to the growth rate of the domestic population, the higher the gains from labour immigration in terms of economic growth. As long as $\beta g_{imm} > g_c$, the economy will gain from the inflow of labour immigrants into the country. Thus, countries that experience a net inflow of labour migration will find it to be in their best interest to create an environment that foster a high value of β . Moreover, when skilled workers enter the labour market of the country and the economy experiences an inflow of educated labour, the value of the factor "years in education" (u) in expression (13) increases, which contributes to the increase in the growth rate of human capital.

The increase in education and its implications for the economy can also be displayed in a graph:

Graph 1: Decreasing technology gap with increasing human capital



1) Denotes the growth rate of human capital in Jones' model of technological transfer, without any inflow of human capital: $\frac{\dot{h}_T}{h_T} = \mu e^{qu} \left(\frac{A}{h}\right)^\gamma$, and 2) denotes the growth rate of human capital when the economy has experienced an inflow of skilled labour in terms of labour immigration (= labour immigration-augmented model of technological transfer, where $\beta g_{imm} > g_c$). α Denotes the technology gap in Jones' model of technological transfer, without any inflow of labour migration along the balanced growth path $\left[\frac{A}{h}\right]^*$. α' Denotes the decreasing technology gap in the labour immigration-augmented model of technological transfer, when the economy experiences an inflow of labour migration with higher human capital than the domestic population.

When the country experiences an inflow of skilled labour (and $\beta g_{imm} > g_c$) the human capital of the country increases from 1 to 2. More advanced technology can be applied in the economy, which moves towards a new, lower, technology gap (α to α'). However, the balanced growth path of the economy (g) will not be affected, which will be further discussed below.

Equation (13) denotes the growth rate of human capital when the economy is not in the balanced growth path (where the growth rate of all factors in the economy is the same) (Jones; 2002, Weil; 2005). As it is assumed that the economy reaches its balanced growth path very seldom, it is also very fruitful to analyse the economy on its way towards (but not in) the balanced growth path (see for example Easterly et al.; 1994, Jones; 2002).

The growth rate of the income of the economy along the balanced growth path is determined by the growth rate of the exogenous technological frontier (A) (Jones; 2002). Thus, the labour immigration-augmented model of technological transfer will not affect the growth rate of income along the balanced growth path of the economy, compared to the original model of technological transfer by Easterly et al. (1994) and Jones (2002). However, it will affect the *level* of income. To arrive at the equation for the level of income in the economy along the balanced growth path according to the labour immigration-augmented model of technological transfer, it is useful to start from Jones' equation of the income of the economy along the balanced growth path in the model of technological transfer.

Jones' equation of the level of income in the economy along the balanced growth path:

$$y^*(t) = \left(\frac{s_K}{n + g + d} \right)^{\alpha/1-\alpha} \left(\frac{\mu e^{qu}}{g} \right)^{1/\gamma} A^*(t) \quad (14)$$

For further background information regarding how Jones arrives at this equation, readers are advised to consult Jones (2002). Equation (14) represents the output per worker along the balanced growth path, where the first term denotes the physical capital accumulation, the second term denotes the accumulation of skills and the last term represents the world technological frontier (Jones; 2002).

In order to translate equation (14) to the level of income along the balanced growth path of the labour immigration-augmented model of technological transfer, the equation for the growth rate of human capital (13) will be substituted into equation (14):

$$y^*(t) = \left(\frac{s_K}{n + g + d} \right)^{\alpha/1-\alpha} \left(\frac{\mu e^{qu}}{\beta(g_C + g_{imm})} \right)^{1/\gamma} A^*(t) \quad (15)$$

Equation (15) represents the level of income along the balanced growth path of the economy in the labour immigration-augmented model of technological transfer. For the case of Canada,

this implies that the economy will benefit from the inflow of skilled labour when the labour immigrants possess higher human capital than the domestic population (see the above conclusions). The *potential* contribution to economic growth by labour immigrants is determined by the relationship between the human capital of the labour immigrants and the Canadian-born population ($\frac{h_{imm}}{h_c}$). The *actual* contribution is determined by the extent to which the labour immigrants can assimilate and transfer their skills into the host society (β). In order to receive the highest economic gains from labour immigration, it will be in the best interest of Canada to promote policies that contribute to as high a value of β as possible, and of course, attract the immigrants with the highest skills. The divergence between the potential and actual contribution will be analysed in the case study of Canada.

The model of technological transfer, as most other theories of economic growth, assumes full employment in the economy (Jones; 2002). Hence, neither the original model, nor the labour immigration-augmented model includes any societal costs related to unemployment of labour immigrants arriving in Canada. If such costs would be included in the model, it is theoretically possible, although not very likely, that the effect of labour immigration on economic growth could in fact be negative for Canada although the contribution to growth by labour immigrants could be higher.

This labour immigration-augmented model of technological transfer could be applied to most countries that receive a net inflow of labour immigrants and are open to technology from the rest of the world. Depending on the level of skills of the incoming migrants, the ratio ($\frac{h_{imm}}{h_c}$) is likely to vary between countries, and the skills of the labour immigrants does not necessarily exceed the skills of the domestic population in all countries.

2.2 Theories of human capital

The labour immigration-augmented model of technological transfer concludes that the labour immigrants' contribution to economic growth in the country of destination is mainly

dependent on two factors; the ratio of the average human capital of labour immigrants in relation to the average human capital of the domestic population ($\frac{h_{imm}}{h_C}$), and the extent to which immigrants integrate with, and can transfer their skills to, the new host country (denoted by the symbol β). In order to analyse the effects of these two factors in the case study of Canada, theories regarding human capital and migration will assist in the understanding of migration decisions and the characteristics of the human capital of migrants. It is beyond the scope of this thesis to determine numerical values of β and the human capital relation ($\frac{h_{imm}}{h_C}$) for the case study of Canada. Hence, theories of human capital will rather assist in the analysis of immigrants' potential to contribute to economic growth in the host country and the barriers that may prevent them from doing so, than aid in providing exact figures of the above expressions.

2.2.1 Human capital theory and migration

The human capital migration model analyzes migration decisions, primarily on the individual's level. The model is based on the assumption that a person will choose to migrate if the present value of the expected returns of migration exceeds the expected costs (Sjaastad; 1962). Costs of migration does not only involve strictly economic costs, such as different costs of living and travel expenses (out-of-pocket expenses), but does also include social costs, psychological costs and costs of uncertainty when settling in a new country, for example regarding the ability to find employment in the new host country's labour market and leaving ones family and friends behind (Sjaastad; 1962). The expected benefits of migration consists primarily of an estimation of the present value of the future earnings in the host country and can be expressed as the ratio of the wage level in the country of destination relative to the wage level in the country of origin (Chiswick; 2000). The greater the wage level in the country of destination compared to that of the country of origin, the greater are the incentives for individuals to migrate. Following this theory, this would suggest that most migrants move from low-wage countries to high-wage countries, which is also recognized by for example Becker, Murphy and Tamura (1990). The case study of Canada includes discussions regarding the source countries of economic migrants to Canada.

2.2.2 Positive selection among labour immigrants

Chiswick further develops the theory of migration decisions based on returns and costs for the individual. He argues that labour immigrants are "favourably "self-selected" for labour market success" (Chiswick; 2000). According to this theory, it is often the most educated, entrepreneurial and able individuals of the native country who make the decision to migrate for economic reasons. The analysis of Chiswick is based on the assumption that individuals with higher education and productivity are not only more efficient on the labour market, but also when it comes to migration. This line of reasoning is also recognized by Chang (2000), who argue that highly educated individuals are more likely to be successful in finding information regarding for example accommodation, employment and schools for the accompanying children, than less educated and productive individuals. Hence, as the most well educated individuals and those with the highest ability (in terms of ambition, intelligence, learning speed, etc.) will be able to integrate in the new country in the most productive manner, it is also those who will make the decision to relocate to another country. In terms of costs and returns, Chiswick and Chang argue that the costs of migration are smaller for individuals with high skills than for those with lower skills. According to this theory, it is also probable that the returns of migration for the most educated and productive migrants are higher than for the less productive, as the former are more likely to find satisfactory and well-paid employment. Furthermore, it is plausible that the transition period in which immigrants search for employment in the new host country is shorter for highly skilled immigrants, which implies that they suffer a smaller loss of earnings than immigrants with lower skills. If the wage ratio (wage in county of destination / wage in country of origin) is greater for highly educated immigrants than less educated immigrants, this further adds merit to the theory that highly skilled individuals find it more favourable to migrate than individuals with low skills (Chiswick; 2000).

Given that the most efficient individuals choose to migrate, they should also be the most efficient when it comes to integration with the host country. In terms of the labour immigration-augmented model of technological transfer, this would suggest a rather high value of β . Chiswick's theory suggests that the inflow of labour immigrants promotes a more productive labour market in the host country. According to the theory of technological transfer, the inflow of qualified human capital would lead to an increase in the amount of

capital goods that the economy can use and thus push the country closer to the world technological frontier.

2.2.3 The Roy model – negative selection

The findings by Chiswick can be contrasted with those of, among others, Borjas, who argue that it may instead be the least skilled workers who choose to migrate for economic reasons, called negative selection (Borjas; 2005:336, Chiquiar and Hanson; 2005). Borjas advocates the usefulness of the Roy model, which states that the returns to human capital in terms of income distribution in the source country in relation to that of the host country determines whether negative or positive selection of immigrants will occur (Borjas; 2005:336). If the income distribution in the source country is more equal, and thus, the returns of having a good education is relatively lower than in the host country, the Roy model predicts that the most educated and skilled individuals will choose to migrate as they will experience a higher return to their human capital in the host country. This is described as positive selection (Borjas; 1987). Conversely, if the income distribution is relatively more unequal in the source country (as is the situation in many low-wage and less developed countries), the least skilled will experience a higher return to “not having an education” in the source country. In this case, the least skilled will choose to migrate and negative selection will occur among immigrants in the host country (Borjas; 1987). Borjas (2005:336) states that: “The key implication of the Roy model is clear: *The relative payoff for skills across countries determines the skill composition of the immigrant flow.*”

If negative selection occurs among economic migrants, this implies that the relationship $(\frac{h_{imm}}{h_c})$ in the labour immigration augmented model of technological transfer is lower than one, $(\frac{h_{imm}}{h_c} < 1)$, and that the economic growth of the country would in fact be negatively affected by the inflow of immigrants.

2.2.4 Asymmetric information – statistical discrimination

The extent to which labour immigrants contribute to economic growth in the country of destination cannot fully be explained using the above theories regarding the characteristics of

the arriving individuals. Labour immigrants' contribution to economic growth is also dependent on the policies that the receiving country adopts in order to take advantage of the qualifications and skills of the arriving migrants, and the potential barriers to integration that lies here within. This, not entirely uncomplicated, relationship will be further developed in the case study of Canada.

Katz and Stark (1987) have developed a theory where asymmetric information between the potential employer in the host country and the labour immigrant could decrease the overall contribution to economic growth by immigrants. Asymmetric information could act as a barrier to integration and the transferability of immigrants' skills, which, in terms of the labour immigration-augmented model of technological transfer, would lead to that value of β falls below its maximum value. Employers in the host country often lack complete information regarding the true qualifications and potential of the individual labour immigrant. Thus, according to Katz and Stark, employers will set the same wage for all labour immigrants, which will be equal to the average product of the total group of non-domestic workers. Following the theory of asymmetric information, this situation will deter highly skilled individuals from migrating, as they are likely to receive a wage below their level of skills in the host country. Labour immigrants with skill levels below that upon which the wage is set will, on the other hand, be encouraged to migrate, which could lower the contributions to economic growth by immigrants (and thus lower the value of β) The concept of using data of the average performance of a certain group of people in order to determine the behaviour of an individual of the group is also known as statistical discrimination (Borjas; 2005:370). "Two devices might work to reinstate informational symmetry: Signalling, which is costly, and revelation, which is time consuming" (Katz and Stark; 1987). These actions will increase the returns of migrants with high skills, as the true qualifications are no longer unknown and, the wage level will adjust to match the qualifications of the individual. The theory of asymmetric information will prove important when discussing the situation of labour immigrants in Canada and their contribution to economic growth.

3 Case study of Canada

3.1 Labour immigration to Canada, an overview

Every year, a large number of people migrate to Canada with the ambition to participate in Canada's diverse labour market. In 2004, Canada accepted 235,824 new permanent residents into the country, which corresponded to approximately 0,7 % of the total population (Citizenship and Immigration Canada). This level reflects a fairly constant pattern of immigration during the preceding decades. The majority of these permanent residents arrive to Canada as labour immigrants through the economic class, and they are accepted with the purpose to contribute to the economic growth of the economy (Citizenship and Immigration Canada).

3.1.1 Importance of economic immigrants for labour force growth

One of the principal objectives of the Canadian immigration policy is to attract highly educated individuals to Canada in order to promote growth of the labour force, and ultimately economic growth of the country (Citizenship and Immigration Canada).³ The importance of economic immigrants in order to achieve labour force growth is continuously increasing. Canada's labour force increased with 1,4 million people between 1991 and 2001, with 70 per cent of the increase attributable to the 978,000 immigrants who arrived in Canada during the decade and joined the country's workforce (Lochhead; 2003). During the same decade, Canada's GDP increased by 37 %, the number of employed Canadians increased by 2,2 million, or 17 %, and the unemployment rate fell from 10.3 to 7.2 % (Lochhead; 2003). According to extensive research on the Canadian labour market by for example Lochhead (2003), immigration is expected to account for *all* of the country's net labour force growth in the coming decades. However, in some provinces, this is the reality already today. In Ontario, the province receiving the majority of the new immigrants, 97% of the labour force growth

³ The second of the two principal objectives is to "maintain the humanitarian traditions of the nation and allow for families to reunite in Canada and to act as a place of refuge for persons facing for example persecution or warfare in his or her country of origin" (Citizenship and Immigration Canada).

resulted from immigration in the 1990's. In the provinces of Nova Scotia and Saskatchewan, which receive proportionately fewer new immigrants, the labour force growth was entirely due to immigration during the decade (Lochhead; 2003).

The reasons of the increasing importance of immigration as a source of new labour are primarily demographic. The Canadian labour force is ageing. In 1990, 26 % of the labour force was over 45 years of age. In 2002, this figure had increased to 34 % of the labour force (Statistics Canada). Combined with decreasing fertility rates among the Canadian-born, immigration accounts for an increasing share of the population and the labour force. In 2017, studies estimate that the percentage of Canadians born outside of the country will increase from today's approximately 18 % to 22 % of the total population (The Daily, March 22, 2005).

3.1.2 Economic class of immigration to Canada

Canada accepts immigrants arriving through the family class, the refugee class and the economic class (Citizenship and Immigration Canada). The majority of all immigrants arriving in Canada are experienced, highly educated and arrive through the economic class of immigration. In 2004, 133,746 persons, or 56,7 %, of all those who were granted permanent residency in Canada belonged to this class. Between 1995 and 2004, the percentage ranged approximately from 50 to 60 % (Citizenship and Immigration Canada). The economic class consists of two main sub-categories: *Skilled workers* and *business immigrants*. In 2004, 113,442 of the 133,746 immigrants arriving through the economic class arrived as skilled workers and 9,762 as business immigrants (Statistics Canada). Skilled workers apply for permanent residency in Canada through a unique point system, which will be explained in detail below. Business immigrants do not enter through the point system, but does instead have to demonstrate that they possess substantial funds available for investment in Canada (Citizenship and Immigration Canada). The remaining immigrants in this class arrived through the *provincial/territorial nominees'* category (6,248 persons), and *live-in caregivers* (4,292 persons) (Citizenship and Immigration Canada).

3.1.3 Selection process through the point system

To fully comprehend the selection process of skilled workers and their future opportunities on the Canadian labour market, it is pertinent to understand the most important and unique feature of the Canadian immigration policy, namely the point system. The formal qualifications of the applicants applying for permanent residency in the "*Federal skilled workers class*" are assessed through a point-based system. In the point system, the future immigrants must demonstrate their ability to find employment in Canada, to adapt to the new country and their overall ability to contribute to the Canadian economy. Points are given for qualifications such as experience, age, language skills and education.

Skilled workers must enter Canada through either the "principal applicant" or the "spouses and dependants" category (Citizenship and Immigration Canada). In the case of an immigrating family, only one member of the family can apply to become a permanent resident in Canada as a "principal applicant". The remaining members of the family apply as "spouse and dependants". However, Simonova (2006) emphasize during the interview conducted with her that when the family is admitted to arrive to Canada as economic immigrants, no differences are made between the primary applicant and the dependants in terms of status, access to language training, etc. It is the principal applicant to become a skilled worker in Canada who must go through the screening process and be judged according to the point system. As the family selects the member that is likely to have the most positive outcome of the screening process in the point system to be the "principal applicant", i.e. the member with the highest education and the most relevant professional experience, this is in many cases likely to be the adult, male member of the family. In 2004, 34,375 persons, or approximately 72 % of the 47,889 skilled workers in the "principal applicant"-class were males and only 13,514 applicants, 28 %, were females (Citizenship and Immigration Canada). This may be an effect of the cultural and social situation in the immigrants' countries of origin.

The maximum mark of the point-evaluation is 100, and to be eligible for a permanent residency, the applicant must receive a minimum of 67 points.

A chart of the point system can be found below:

Table 1: Point system for skilled workers

Factor	Maximum points
Education	25
Official Languages	24
Experience	21
Age	10
Adaptability	10
Arranged Employment in Canada	10
Total points (pass)	100 (67)

Source: Citizenship and Immigration Canada

According to Citizenship and Immigration Canada, the above categories have several sub-categories where points are awarded according to different criteria. A maximum of 25 points are awarded to those with a Master's degree or a Ph.D. degree and at least 17 years of work experience. A Bachelor's degree and at least 15 years of relevant work experience gives 22 points. A completed high-school diploma, for example, gives 5 points. Points are also awarded for knowledge of the two Canadian official languages, English and French. Comprehension of one of either English or French gives a maximum of 16 points. Proficiency in the other official language as well can give a maximum of 8 points. Together they add up to a maximum of 24 points. Relevant working experience within a recognized field of employment gives a maximum of 21 points. Full marks (10) in the "age"-category are awarded to those between 21 and 49 years of age, as this is regarded as the "prime time" in the career where the contribution to the Canadian economy is assumed be the greatest. Two points are deducted from the top mark for each year that the applicant deviates from this age-span. Zero points in this category are thus given to persons under 17 years and over 53 years of age. In the "adaptability"-section (maximum of 10 points), marks are awarded for different factors that facilitates for the immigrant to adapt to the new country and society. These include the education of the spouse (and thus how likely the Canadian authorities believe that he or she is to find employment), previous studies and work-experience in Canada and family relationships in Canada. Each sub-category can give 3-5 points, but the upper limit is 10 points. If employment is already arranged in Canada, this will give the final 10 marks of the test.

The point system can only evaluate the observable characteristics of immigrants. Unobservable characteristics, such as the general productivity of an individual, or his or her moral attitude towards work cannot be measured with the point system.

The applicants must also demonstrate that they possess sufficient funds to be able to settle in Canada without economic aid, in order to be eligible to become permanent residents as economic immigrants to Canada (Citizenship and Immigration Canada).

3.2 Characteristics of labour immigrants to Canada

The point system acts as a tool in order for the Canadian authorities to select the immigrants with the observable skills that they consider to be important for success on the Canadian labour market. The majority of the skilled workers that Canada attracts are highly educated individuals, often with rigid backgrounds of professional experiences within their fields, and with the potential of making an actual contribution to the Canadian economy. The economic immigrants are often more educated than the Canadian-born population and they add an important dimension, both skill-wise and in terms of academic competence, to the Canadian labour market (see for example Lochhead; 2003, Reitz; 2005). In the labour immigration-augmented model of technological transfer, it was assumed that the human capital that labour immigrants possess has different characteristics than the human capital of the domestic population. The background of this assumption and its presumptive effect on economic growth will be outlined below.

3.2.1 Geographical origin

The majority of the labour immigrants who gained permanent residency in 2004 originated from the region of Asia and the Pacific. Approximately half of all economic immigrants (49,7%) came from this area (Citizenship and Immigration Canada). 21,1% were immigrating from Europe and 20,6% from Africa and the Middle East. The remainder of the Americas was less represented among the economic immigrants to Canada, with 6,3% originating from South and Central America and 2,2 % from the neighbouring nation, the United States (Citizenship and Immigration Canada). The vast majority of economic immigrants arrive in Canada while in the prime age of their professional career, between 25 and 49 years old.

However, this is encouraged by the design of the point system, as it awards the highest marks to applicants of this age. The individual countries from which Canada accepted the highest number of immigrants were in 2004: China (15,4% of granted permanent residencies), India (10,8%), the Philippines (5,6%) and Pakistan (5,4%) (Citizenship and Immigration Canada)⁴. The above statistics include immigrants to Canada from all immigration categories (the economic, refugee and family classes). However, as almost half of the economic immigrants to Canada originated from Asia and the Pacific's in 2004, it is plausible that the above list can act as at least a rough estimate of the distribution of countries of origin of labour immigrants to Canada. The United Nations has classified India and Pakistan as "low income countries"⁵ and China and the Philippines as "lower middle income countries"⁶ which supports the theory that economic migrants tend to move from low-income countries to high-income countries (United Nations). During the latest decades, there has been a change in source countries of immigrants to Canada, from traditional source countries, such as the United States and Northern, Western and Southern Europe, towards non-traditional source countries, including Eastern Europe, Africa and Asia (Aydemir and Skuterud; 2005).

3.2.2 Education

Compared to the Canadian-born population, immigrants, and especially economic immigrants, in Canada are very well educated. In 2004, 79.6% of all principal applicants over 15 years of age in the economic immigrants-class possessed at least a Bachelor's degree. Of these, 51.6% had a Bachelor's degree, 23.5% a Master's degree and 4.5% a Doctorate degree (Statistics Canada). Of the Canadian-born population, only 22,6 % possessed a university-degree, according to the census in 2001 (Statistics Canada). Among the class "spouses and dependants", the level of education of those over 15 years of age was significantly lower than among the principal applicants in 2004, with 45% possessing at least a Bachelor's degree. However, compared to the Canadians' education level, this is still very competitive. Among the spouses and dependants, 33.9% immigrated with a Bachelor's degree, 9.8% with a Master's degree and 1.3% with a Doctorate degree (Citizenship and Immigration Canada). According to the labour immigration-augmented model of technological transfer, education is the main determinant of human capital. As the education of labour immigrants is considerably

⁴ The remaining source countries of the "Top-10" list were in 2004: United States (3,2%), Iran, (2,6%), United Kingdom (2,6%), Romania (2,4%), Republic of Korea (2,3%) and France (2,1%).

⁵ GNI/capita <USD825/year, 2004

⁶ GNI/capita USD825/year-USD3255/year, 2004

higher than that of the Canadian-born population, labour immigration should have a significant effect on economic growth.

3.2.3 Language skills

To demonstrate skills in the official languages of the country in which one settles is vital for the integration process and access to the labour market. In 2004, 22,4% of the principal applicants in the economic immigrants-class stated that they were proficient in both of Canada's official languages, English and French (Citizenship and Immigration Canada). This can be compared with the statistics from the 2001 census, where it was stated that approximately 13,3% of the total Canadian population have knowledge in both the Canadian official languages (Statistics Canada). 55.7% of the principal applicants claimed knowledge in English only and 4.3% spoke French only. 17.6% stated that they had no knowledge of either language (Citizenship and Immigration Canada). Among the "spouses and dependants"-class, 7,3% declared to master both the official languages, 38% possessed skills in English only, 4,2% in French only and 50.6% stated that they spoke neither English, nor French (Citizenship and Immigration Canada).

3.3 Labour immigrants' effects on economic growth in Canada

3.3.1 Labour immigrants' potential contribution to economic growth

The data presented above suggest that most labour immigrants to Canada are indeed highly qualified for success on the Canadian labour market and that they have great potential to contribute to the economic growth of the country. Thus, the effect of economic immigrants in the labour immigration-augmented model of technological transfer should be significant and positive. The division of the human capital-component of the model into human capital of the Canadian-born population (h_c) and the human capital of labour immigrants (h_{imm}) gives a better view of the immigrants' contribution to economic growth. When examining the characteristics of labour immigrants, it can be concluded that the ratio between the average human capital of labour immigrants in relation to the average human capital of the Canadian-

born population ($\frac{h_{imm}}{h_c}$) is greater than one, which implies that labour immigrants have the potential to make greater contributions to economic growth than the average Canadian. This also suggests that merit could be given to Chiswick's theory of positive selectivity among economic migrants.

Although that the dependence on immigration for labour market growth is increasing and that the majority of economic immigrants has high skills, statistics and research suggest that the labour situation of economic immigrants to Canada is still open for improvements. Immigrants are likely to experience barriers to integration and the transfer of skills. Whilst the above sections have been directed towards the higher human capital of labour immigrants to Canada ($\frac{h_{imm}}{h_c} > 1$), the following sections will treat how the barriers affect the value of β in the labour immigration-augmented model of technological transfer. This will be followed by a discussion around some possible explanations to why these barriers exist in the Canadian society.

3.3.2 Labour immigrants' actual contribution to economic growth

Substantial contemporary research has been directed towards the Canadian utilization of immigrants' qualifications. Often, studies suggest that a significant underutilization of immigrants' skills exists on the Canadian labour market. Some of the evidence will be outlined below. Reitz (2005) points to the trend of deteriorating earnings and employment success of immigrants, despite their increasing skill levels. This pattern is also recognized by Baker and Benjamin (1994), who found that the initial earnings of recent immigrants deteriorated during the time period of their study, especially for immigrants belonging to visible minorities⁷. The results of the study by Frenette and Morissette (2003) for Statistics Canada, who studied immigration data from the 1971-2001 censuses, are analogous to the previous conclusions. Throughout the time period, relative earnings of recent immigrants compared to their Canadian-born counterparts have deteriorated drastically (Frenette and Morissette; 2003). Aydemir and Skuterud (2005), whose study is comprised of census data from 1971-2001, confirm the decline in entry earnings of immigrants during the 30 years of

⁷ The study is composed of data from the censuses of 1971 – 1986.

study. Furthermore, Reitz finds that: “foreign-educated immigrants earned \$2.4 billion⁸ less than native-born Canadians with formally comparable skills, because they worked in occupations below their skill levels” (Reitz; 2005). He also concludes that; “at least two-thirds of these unutilized foreign-acquired skills –worth \$1.6 billion – are in fact transferable to Canada” (Reitz; 2005).

Not only have the initial earnings of recent immigrants declined during the latest decades, the catching up process, in order for the earnings of immigrants to converge with those of the Canadian-born, has also slowed down (Frenette and Morissette; 2003, Baker and Benjamin; 1994). This could represent changing conditions of the labour market for immigrants. Immigrants often experience higher levels of unemployment than the Canadian-born population (Baker and Benjamin; 1994). Employment rates of immigrants have also deteriorated during the last decades (Baker and Benjamin; 1994).

The above findings are representative for the Canadian literature on labour immigration, which generally emphasize the underutilization of labour immigrants’ skills. This picture of reality can appear contradictory to the conclusions of the theoretical framework of the thesis and the evidence regarding labour immigrants’ education and skills. The human capital theories and the labour immigration-augmented model of technological transfer advocate that the labour immigrants to Canada have high potentials to contribute to economic growth. The observed characteristics of labour immigrants support the theories. Hence, there seem to exist a divergence between theory and reality regarding the labour market situation of immigrants. On the basis of the findings on the underutilization of immigrants’ skills, it can be concluded that the value of β (the factor denoting the integration and the transferability of immigrants’ skills) is likely to be below its maximum value. It is natural that a transition period occurs when migrating to another country, during which the individual integrates with the society and labour market of the host country. However, the difficulties faced by labour immigrants on the Canadian labour market, despite their superior education levels, suggest that barriers to integration and the transferability of skills exist, which prolongs and decreases the efficiency of the transition period and prevents economic immigrants from integrating into the labour market in the best possible manner. The discussion that will follow focuses on the main

⁸ Canadian dollars (CAD). On December 13th 2006, CAD 1 corresponded to SEK 5.90, according to Bank of Canada

reasons to why these barriers exist and that the value of β is likely to be below its potential maximum. Before this analysis, it is important to mention the limitations of the above data.

3.3.3 Limitations of data

When discussing the earnings and catching-up effect of labour immigrants, it is difficult to obtain statistics on immigrants' position on the labour market that is specifically divided into the three categories of immigrants (the family class, the refugee class and the economic class). The earnings of immigrants who arrived through the economic class are often not distinguishable from that of the other classes of immigration. However, this will not necessarily impede the analysis. The main purpose of the immigration-related statistics is to highlight patterns and trends over time regarding the integration of labour immigrants and the transferability of their skills. Thus, the data can still be useful, albeit the fact that additional groups of immigrants are included in the statistics. If it is assumed that labour immigrants have the highest initial and progression of earnings, the presence of other immigration categories could possibly cause that the earnings of immigrants in general appear to be lower than that of labour immigrants specifically. Furthermore, the situation of immigrants on the Canadian labour market has not been analysed in comparison to the general state of the Canadian economy at a particular point in time. Fluctuations in the business cycle are likely to affect the earnings and employment rates of immigrants, as well as the Canadian-born population. However, it is still possible to see clear trends regarding for example the deteriorating initial earnings of immigrants to Canada.

3.4 Possible reasons for the divergence between labour immigrants' potential and actual contribution to economic growth

The previous discussion concluded that it is probable that a divergence between labour immigrants' potential and actual contribution to economic growth exist in the Canadian economy. In terms of the labour immigration-augmented model of technological transfer, it can be concluded that the gains to economic growth from the higher human capital of immigrants, ($\frac{h_{imm}}{h_C} > 1$), is likely to be lowered due to the barriers to integration and

transferability of skills (β falls below its maximum value). This section will discuss some of the most likely reasons to why this divergence exists, and analyse them according to the findings of the theoretical framework.

3.4.1 Recognition of credentials

Both immigrants and employers state that one of the most pronounced barriers for immigrants to participate in the Canadian labour market with their full potential, is the problems related to the recognition of immigrants' educational credentials (see for example Simonova; 2006, Lochhead; 2003). "Essentially, the problem has to do with immigrants' educational experiences acquired outside of Canada not being fully recognized as equal to those of native-born Canadians, in terms of human capital quality and accreditation standing" (Li; 2000). Li also argues that the educational credentials of visible minority immigrants are being attached with a lower market value than their equivalent non-minority counterparts (Li; 2000). Alboim et al. (2005) supports this theory and find in their study regarding the discounting of immigrants skills in Canada that immigrants from certain geographical areas, such as Central Europe, receive lower returns to education than immigrants of non-visible minority origin, for example from Western Europe. On the contrary, male immigrants from non-visible minority origin (such as the United States and the United Kingdom) have higher earnings than their Canadian counterparts (Alboim et al.; 2005). Visible minority women have the lowest returns to education in terms of earnings (Li; 2000). From the above data, it can be concluded that the educational status of academic credentials from particular geographical areas is higher than for others and also yield higher returns in terms of earnings. Li suggest that immigrants from source countries where the knowledge of Canada's two official languages (English and French) is very good also receive the highest returns to education after immigration to Canada. Aydemir and Skuterud (2005), have analysed changes in the returns from foreign degrees in the Canadian labour market during a 30-year period, and conclude that the returns have stayed relatively stable during the period of study.

Occupations in Canada are divided into two categories; regulated occupations, which require professional certification in order to be exercised, such as physicians, electricians, engineers, etc, and unregulated, which one is able to practice without a license (Canadian Information Centre for International Credentials). Five centres in Canada assess the credentials of immigrants, where immigrants can apply for professional certifications (Canadian

Information Centre for International Credentials). The inhabitants of each province are allocated to the closest centre. The assessment is often a lengthy process, which can take several months to complete (Sangster; 2001). Resulting from the long waiting times in order for labour immigrants' to receive a certificate, labour immigrants often have to resort to employment below their skill levels, which could partly explain the low initial earnings of labour immigrants. Some educated labour immigrants stay in low-skilled employment, which prevents them from contributing to the Canadian economy with their full potential (Simonova; 2006, Lochhead; 2003). The process of certification can only be initialized once the immigrant has already arrived in Canada (Simonova; 2006, Canadian Information Centre for International Credentials). Hence, when skilled workers migrate to Canada, they lack knowledge of the value of their academic credentials in the host country, which increases the immigrants' insecurity regarding his or her possibilities of obtaining employment within their professional fields. Research of immigrants' possibilities of employment success in Canada demonstrate that, in some occupations, foreign-trained immigrants are demanded to possess greater experience and education than their Canadian counterparts in order to receive professional certification (Li; 2000). The study by Sangster (2001) shows that several Canadian employers also find the licensing processes to be too restrictive, which, together with the above evidence, suggest that the immigrants' education and experience is being discounted in Canada. Even though immigrants possess higher human capital in terms of education than Canadian-born workers, their possibilities of exercising their skills are lower. Furthermore, it is probable that the transition period during which the immigrant search for employment will increase and that his or her process of integration with the host society will slow down. Thus, the contribution to economic growth by labour immigrants will most likely fall below its potential maximum level. In terms of the labour immigration-augmented model of technological transfer, it is plausible that this problem will lower the value of β .

Labour immigrants applying for unregulated occupations are open to assessment by the individual employers, which leaves employers to resort to various assessment tools, such as certification aid provided by universities and informal networks of colleagues and other individuals from specific countries, who possess country-specific knowledge regarding credentials and skills (Sangster; 2001). The process is often both difficult and time-consuming and is likely to lack objectivity. As credentials are assessed differently according to the individual employer, some immigrants are likely to benefit more from the process than others, who apply for employment at workplaces where stricter procedures when recognizing foreign

credentials are used. This could increase the insecurity on the labour market for immigrants, and increase the costs that are related to migration. The lack of sufficient general guidelines for employers risk to result in that Canadian economy is deprived of the education and skills that labour immigrants possess.

Hence, employers are likely to suffer from asymmetric information regarding the true skills and educational credentials of labour immigrants, which could prolong the process of integration with the host country and lower the value of β .

Li (2000) argues that policies that facilitate recognition of credentials would contribute to a significant increase of economic immigrants' integration on the Canadian labour market: "...policies that help to recognize foreign credentials as equivalent to Canadian credentials in the labour market would contribute to bridging the income gap between native-born Canadians and immigrants. Such recognition would close about half of the income difference for visible minority immigrants – between female native-born Canadian degree holders and female immigrant foreign degree holders, as well as between male native-born Canadians and their immigrant counterparts."

3.4.2 Lack of Canadian experience

Although newly arrived labour immigrants possess high human capital in terms of education and foreign-acquired skills, their lack of Canadian experience, both employment and cultural-wise, can deter them from participating in the Canadian labour market according to their true potential. Li (2000) emphasises the importance of Canadian experience in order to achieve labour market success and argues that immigrants, especially those belonging to visible minorities, find it difficult to enter the labour market due to their lack of country-specific experience. This issue can most likely explain part of the earnings disadvantage of newly arrived immigrants in Canada. As the time since immigration increases and the immigrants settle in their new country, this problem is, theoretically, assumed to decrease as integration increases. When controlling for foreign-acquired human capital, Baker and Benjamin (1994) concludes that "immigrants generally earn relatively lower returns to both education and experience" and that "the relative returns to experience [...] have been deteriorating over time". A significant deterioration of returns to foreign experience is also found by Aydemir and Skuterud (2005), who further conclude that the decline has to a large extent occurred

among immigrants from non-traditional source countries. This deterioration suggests that the importance of country-specific experience in Canada has increased, which could also imply increasing problems of asymmetric information by for example Canadian employers. The importance of Canadian working experience is also brought to attention by Alboim et al. (2005), who find that “one year of domestic experience generates the same return as two-and-a-half years of foreign experience”.

The point system that is used in the selection process of labour immigrants to Canada puts more emphasis on formal education than on-the-job training and learning a profession through for example apprenticeships (Simonova; 2006). Hence, skills acquired through informal education outside of Canada, are discounted by the Canadian authorities compared to formal, academic education.

Furthermore, barriers to integration and transferability of skills of labour immigrants imply increasing uncertainty regarding economic immigrants’ success in the labour market of the host country. Costs of migration, both the psychological costs of uncertainty, and the economic costs (such as increased costs of foregone earnings due to prolonged transition periods until the labour immigrant finds employment in the host country that matches his or her skills) will increase. This uncertainty of labour market success also affects very effective immigrants, such as those discussed by Chiswick, and is expected to have a negative effect on the value of β in terms of the labour immigration-augmented model of technological transfer. The arising problems due to immigrants’ lack of Canadian experience can in many cases be compared to the consequences from the embedded inertia in recognizing immigrants’ educational credentials.

3.4.3 Geographical distribution of immigrants’ source countries

Aydemir and Skuterud (2005) observe that labour immigrants generally arrive from different countries of origin today than they did some decades ago. As stated earlier in the thesis, the nations that most immigrants to Canada migrate from today are primarily Asian, Central European and Eastern European countries (non-traditional source countries), while earlier immigration was more concentrated from traditional source countries (such as Western Europe). It is possible that the change of source country structure and the characteristics of the visible minority immigrants can explain part of the changing labour market conditions of

newly arrived labour immigrants. Even though they are very well educated and possess high human capital, it is likely that skills acquired in an environment very different to that of Canada, are less transferable to a Canadian context.

Aydemir and Skuterud (2005), find that especially immigrants from non-traditional source countries, such as Eastern Europe, Asia and Africa, experience that the value of their foreign-acquired experience is discounted in Canada. It is suggested that the deterioration of the relative returns of labour immigrants' working experience could depend on the change of source countries during the latest decades. Immigrants from non-traditional source countries may find their skills to be less transferable to a Canadian context. For example, the above areas could have undergone a different technological progress than that of Canada and thus, the experience from those areas may not be demanded to a great extent in Canada (Aydemir and Skuterud; 2005). The change of the Canadian economy towards becoming more knowledge-based and that the human capital of some immigrants may lag behind is also recognized by for example Reitz (2005). According to the labour immigration-augmented model of technological transfer, the change of labour immigrants' source countries (and also, the characteristics of immigrants) is likely to contribute to that the value of β falls below its potential maximum value.

The previous sections "Recognition of credentials" and "Lack of Canadian experience" also contain evidence that labour immigrants from non-traditional source countries find the Canadian labour market to be more disadvantageous than for labour immigrants from traditional source countries.

Considering that the majority of the "top ten" source countries in 2004 are likely to have an income structure that is relatively more unequal than that of Canada, it is relevant to discuss Borjas' (1987) theory regarding negative selection and the Roy model. It is not possible to exclude that the relatively even income structure of Canada may attracts the labour immigrants who are not the most suitable for success on the Canadian labour market and contribution to economic growth in Canada, and who does not possess the highest human capital.

The two following sections regarding the barriers to integration and the transferability of skills are in part related to the change of source countries of labour immigrants to Canada that has occurred the latest decades.

3.4.4 Language barriers

Skills in the languages of the host country are vital for successful integration with the new society. As the composition of immigrants' countries of origin has changed during the latest decades in favour of non-traditional source countries, it is plausible that this has affected the language skills among labour immigrants. Lack of skills in English and/or French is likely to contribute to some of the earnings disadvantage of newly arrived labour immigrants to Canada. The importance of language skills is also emphasized by the design of the point system, where knowledge of the official languages is awarded high marks. This importance is also recognized by for example Alboim et al. (2005), who argue that "some of the returns to education – domestic and foreign alike – are actually related to language skills (or to other abilities with which literacy is correlated) rather than to education per se." Jackson and Smith (Policy Research Canada) point to the fact that many newly arrived labour immigrants have solid education and professional experience, but limited language skills.

Sangster (2001) finds that a number of employers in Canada seem to value relevant experience and language skills higher than academic credentials, which further emphasize the importance of appropriate language skills in order to be successful on the host country's labour market. Thus, lack of sufficient language skills in the official languages of Canada is likely to prolong the process of integration and act as a barrier to immigrants' contribution to economic growth according to their true level of skills. This will have a negative effect on the value of β according to the labour immigration-augmented model of technological transfer.

3.4.5 Taste discrimination

One cannot neglect the fact that labour immigrants' disadvantages on the Canadian labour market may partly stem from pure racial discrimination (see for example Jackson and Smith). The concept of discriminating on the labour market on the basis of gender, racial origin, etc, is known as taste discrimination (Borjas; 2005:358). Immigrants belonging to visible minorities indeed experience lower returns to education and professional experience than non-

minorities. Jackson and Smith (Policy Research Canada) find that newly arrived immigrants (especially from non-traditional source countries) experience taste discrimination on the Canadian labour market, which would affect labour immigrants' actual contribution to growth negatively. However, this may not necessarily originate from employers' preferences regarding race or national origin, although the extent of discrimination is a very difficult concept to quantify. As Li (2000) points out: "...gender and racial characteristics of holders of credentials cannot be separated from the credentials themselves, since they produce complicated interaction effects." Alboim et al. (2005) finds that the discounting of immigrants skills is not only a matter of taste discrimination, as, according to their calculations, the returns to foreign education and experience of visible minority immigrants increase if the individual also educate him- or herself in Canada. As immigrants from non-traditional source countries, such as Eastern Europe, Asia and Africa, experience the strongest disadvantages on the Canadian labour market, their difficulties could be related to language barriers and as well as education and previous working experiences that are less transferable to a Canadian context. Cultural barriers may also prolong the process of integration for some immigrants.

3.4.6 Clustering

The main reasons for the existence of a divergence between labour immigrants' potential and actual contribution to growth in Canada have now been examined. Moreover, another possible reason could include the phenomenon of clustering of immigrants in the metropolitan areas. 75 % of all immigrants to Canada settle in one of the three largest cities, Vancouver, Montreal or Toronto (Frenette and Morissette; 2003). The tendency for immigrants to cluster in metropolitan areas has increased during the latest decades and is predicted to increase even further in the future (Grenier; 2003). This prevents many less densely populated areas, who are in demand of inflow of skilled workers for economic and labour market growth, from benefiting from the human capital of labour immigrants. Some (for example Simonova; 2006) argue that the total Canadian economy would gain from a more equal distribution of the geographical areas in which immigrants settle. Naturally, additional reasons for the divergence that have not been discussed in this context may prevail.

4 Summary and conclusion

This thesis has studied the positive effects and the limitations of labour immigrants' contribution to growth in the host country. The construction of the labour immigration-augmented model of technological transfer, which separates the contribution to growth by the domestic population and the labour immigrants, has, together with theories of human capital and migration, facilitated the analysis of the case study of Canada and argued that countries benefit in terms of economic growth from promoting an environment where the barriers to immigrants' integration and transfer of skills stay as small as possible. Although the study has been country-specific to Canada, its conclusions have a general character and can be applied to most countries that experience a net inflow of labour immigration.

The labour immigration-augmented model of technological transfer, which was constructed in the thesis, and the subsequent case study of Canada, concludes that the human capital (in terms of education) of labour immigrants to Canada is higher than that of the Canadian-born population. Thus, their *potential* contribution to economic growth in Canada is higher than the domestic equivalent. However, the labour immigrants' *actual* contribution is determined by the extent to which the human capital of immigrants can be transferred to a Canadian context and how well the immigrants integrate with the host society. The thesis has shown that the existence of barriers to integration and the transferability of skills create a divergence between the potential and the actual contribution to economic growth by labour immigrants. The thesis argue that the reasons behind this divergence are both due to the inefficiencies of the Canadian policies regarding the integration of labour immigrants with the host society and labour market and due to the characteristics of the individual immigrants. Moreover, a trade-off is likely to exist between the higher human capital of labour immigrants to Canada, in terms of education compared to their Canadian-born counterparts ($\frac{h_{imm}}{h_C} > 1$), and the barriers to integration and transferability of skills ($1-\beta$) that they experience. Without numerical values of β and the ratio of human capital of immigrants and Canadian-born, it is difficult to determine which effect is dominating, and thus whether the country gains from labour immigration in terms of economic growth. The vast literature that is available on the matter

proves that the integration of immigrants is an important issue to the Canadian society, and that there is substantial awareness of the problems of barriers to the integration of immigrants. Furthermore, Canada's extensive investments on attracting labour immigrants with high skills suggest that the Canadian authorities view the "human capital-effect" ($\frac{h_{imm}}{h_c} > 1$) to be stronger than the "barriers to contribution-effect" ($1 - \beta$). The use of a point system of selecting immigrants express the Canadian devotion to attracting the immigrants with the characteristics that are related to the highest success on the Canadian labour market. However, it is important to emphasize that the point system can only determine the observable characteristics of immigrants, but the unobservable, such as an individual's personal productivity and ability to adapt to a new host environment.

5 Suggestions for further research

The limited scope of this thesis leaves an open field for further research and elaborations of the model. In order for the labour immigration-augmented model of technological transfer to reflect the real conditions of the world to a greater degree, it could for example be extended into incorporating a cost aspect to the β -variable. The model of this thesis implies that the higher the value of β , the higher the economic growth of the country, and it also implies that the value of β can be raised without any cost. However, to implement policies that would result in a higher value of β is probably associated with costs. If a cost aspect would be included in the model, the long run state of the economy could be calculated, where the costs of augmenting the value of β does not exceed the gains from labour immigrants' contribution to growth. Furthermore, a factor denoting the number of labour immigrants in a country in relation to the domestic population could be incorporated into the labour immigration-augmented model of technological transfer. As long as ($\frac{h_{imm}}{h_c} > 1$), the labour immigration-effect on economic growth of the country increases with the proportion of immigrants in the population. These elaborated models could be used in order to calculate numerical values of national income, with and without a net inflow of labour migrants. Comparisons between countries and over time could be conducted, bearing in mind that there most likely exist a time-lag between the date of immigration and the point in time when the immigrant contribute the most to economic growth in the host country. As this thesis does not touch upon gender issues and how labour immigration affects men and women respectively, this is also a suggestion to interesting further research on the topic.

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