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## Article

# How to attract high skilled labor?

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# HOW TO ATTRACT HIGH SKILLED LABOR? STUDY CASE IN THE UNITED STATES

*ŠÁRKA PRÁT, JAMES PEPPER, LISA NGUYEN*

## **Abstract:**

This paper argues that the US immigration system is anachronistic in today's global economy, where human capital is increasingly crucial for successful advanced economies. It argues that some consensus over reform is certainly possible, and it seeks to understand the reasons behind the failure of previous attempts at reform. It makes a thorough investigation of the dynamics of high-skill immigration to the US through a systems analysis, which is controlled for mid-long term global dynamics and key actor preferences. The systems analysis utilise the latest research in immigration economics to evaluate the relative importance and dynamics of the determinants of the US immigration system. These inputs are mapped and their interactions analysed to determine which changes in US immigration policy would be most beneficial for high-skill immigration. From this analysis, it makes a series of policy prescriptions for reforming US immigration policy to adapt to current and future trends. This policy paper primarily differentiates itself with the significant contribution of allowing policymakers to estimate and react to future trends. It also provides some practical advice on how to achieve these reforms due to its inclusion of sub-models of actor interaction informed by public policy approaches.

## **Keywords:**

labour, United States, migration, labour market, work

**JEL Classification:** F66, R23, F22

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## Introduction

“In 2009, former Federal Reserve Chairman Alan Greenspan stated more skilled immigrants were needed to cope with the retirement wave of skilled baby boomers. Testifying before a Senate subcommittee on Immigration, Border Security, and Citizenship”

“He noted that skill shortages in America exist because of the policy of shielding skilled workers from world competition. This in turn led to a “privileged elite” whose incomes are being supported at noncompetitively high levels by immigration quota” (Koven & Gotzke, 2010, pp. 198, 199)

Immigration politics in the US is characterised as a “historical tug of war between admissionist and restrictionist partisans of immigration” (Duncan, 2012, p. 136) with an overrepresentation of rhetoric, scaremongering and quasi-economics. The result has been a restrictive immigration system that ensured that the yearly numbers of high-skilled immigrants to the US has stayed flat, while other advanced economies are increasingly benefitting from high-skill immigration.

This paper argues that the US immigration system is anachronistic in today’s global economy, where human capital is increasingly crucial for successful advanced economies. While countries such as Canada, Australia and the UK have slowly reformed their immigration systems to attract global inflows of human capital. The US has maintained its system of privilege for family based immigration over employment-based immigration, and placed numerous procedural obstacles into the visa process. As wage differentials between countries decrease (PWC, 2013) and competition for human capital increases, the US immigration system will increasingly stand out as undesirable for potential high-skilled migrants. In order to maintain economic growth and the US position as a world leader in high-tech industries, the US must introduce reforms to maintain a sufficient supply of high-skilled immigrant labour.

While the debate over the proper level and shape of immigration in general is as fierce as ever, there is a growing recognition that highly skilled immigrants bring a number of benefits to the country through higher productivity, new skills, new innovations and a number of start-ups. For example, more than half of the start-ups in the US which are over \$1 billion in value were founded by immigrants (Anderson, 2016). This argues that some consensus over reform is certainly possible, and this paper also seeks to understand the reasons behind the failure of previous attempts at reform, such as the Immigration Reform Act (2007) and the STEM<sup>1</sup> Jobs Act (2012), to provide a roadmap for future success.

This paper, therefore, makes a thorough investigation of the dynamics of high-skill immigration to the US through a systems analysis, which is controlled for mid-long term

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<sup>1</sup> Science, Technology, Engineering and Maths

global dynamics and key actor preferences. The systems analysis will utilise the latest research in immigration economics to evaluate the relative importance and dynamics of the determinants of the US immigration system. These inputs will then be mapped and their interactions analysed to determine which changes in US immigration policy would be most beneficial for high-skill immigration. From this analysis, this paper makes a series of policy prescriptions for reforming US immigration policy to adapt to current and future trends. This paper will also include an in-depth analysis of the specific deficits of the much abused H-1B program, since it is the most significant temporary immigration visa for high-skilled workers.

This policy paper offers a comprehensive insight into the determinants of immigration outcomes in the US by building a clear picture of factor interaction and relative importance. Many policy papers and policy analyses have criticised aspects of the US immigration system, but few have sketched the relative importance of these criticisms as priorities for reform. This policy paper primarily differentiates itself with the significant contribution of allowing policymakers to estimate and react to future trends. The models are clearly presented and based on generally agreed long term trends; but can also be easily revised and updated. Many of the policy prescriptions advocated here, such as moving to a points system, a very similar to the prescriptions found in other papers (Tabag, 2013) (Wadhwa, et al., 2009) (Duncan, 2012). Yet the policy prescriptions here are more informed and better refined due to a systemic understanding of immigration outcomes in the US, now and in the future. In addition, this paper provides some practical advice on how to achieve these reforms due to its inclusion of sub-models of actor interaction informed by public policy approaches.

## **Policy problem**

The policy problems associated with high-skill immigration to the US are identified by many authors (Kerr, 2014) (Koven & Gotzke, 2010) (Tabag, 2013) (Wadhwa, et al., 2009), but essentially contain four components:

### **Growing pool abroad and shortfall of the domestic pool**

EU expansion and rapid development in India and China has meant that there is a growing pool of highly educated workers. These workers can either be incorporated in the US economy to drive real productivity growth, or can improve the economies of the US's competitors. Over the last 10-15 years, India's tertiary enrolment rate grew by 300% while China's grew by 500%, in comparison the US's tertiary enrolment rate grew by 15% and has been stagnant over the last 5 years (UNESCO, 2016). This trend of rapid growth in tertiary enrolment is similar for other developing and East European countries and will likely continue alongside economic growth. A recent study from Georgetown US projects that by 2020, the US will have a 5 million shortfall of workers with post-secondary education, and quotes other estimates as high as 20 million (Carnevale, et al., 2013).

**Growing importance**

The benefit of high-skilled immigration for advanced economies is clear. Economic analysis of the growth effects of migration conclusively show that skilled migration is the most beneficial form (Young-Bae, et al., 2010). For the US, high-tech sectors, which comprise 23% of total output (Wolf & Terrell, 2016), are already reliant on a constant supply of human capital for growth. Silicon Valley and Wall Street are just a two famous clusters of many industries across the US reliant on human capital. This importance will only increase as the high-tech sector develops as a core driver of growth.

**Stagnant system**

The US visa system currently doesn't allow higher numbers of high-skill immigrants. The system is based on numerical limits set by Congress and demand for high-skill immigrants far outstrips supply. This is clearly evidenced by the consistently higher numbers of applications for visas, from US companies, than the current quotas. In addition, the system itself is antiquated and inefficient, discouraging many immigrants and picking from the pool at random; instead of prioritizing the most skilled.

**Growing competition**

It is not just the US that will require greater numbers of human capital in the future, other developed economies also compete for the global supply of high skill labour. More than 60% of high income OECD countries have policy objectives to 'raise high-skilled immigration' (Parsons, 2015) and Australia, Canada, the UK and Germany are 4 of the most common destinations for high-skill labour. The US is poorly placed for this competition. The US immigration system does not prioritize high-skill labour, and only awards 14% of visas based on skills, compared to 60% in Canada and 68% in Australia (Orrenius & Zavodny, 2014). In addition, the US is ranked as 9th on the Migration Integration Policy Index (MIPEX, 2015) for a number of disincentives to immigration. Canada and Australia both award very similar numbers of employment based visas to the US, despite having economies one tenth the size of the US': In 2013, Canada awarded 150,000 employment based permanent visas (Government of Canada, 2014a) and 45,000 temporary visas for high-skilled migrants (Government of Canada, 2013). In 2013, Australia awarded 110,000 temporary visas for skilled entrants and 128,000 permanent visas (Australian Government, 2014a). In comparison, in 2015 US awarded 140,000 permanent employment visas and approximately 170,000 temporary visas for high-skill entrants (see appendix A). Relative to the size of the US economy, the US is already far behind in attracting high-skill labour. It is only US's relatively high wage in high-skill sectors which continues to secure a steady supply of immigrants, and as the wage differential between other countries decreases, the US may not be able to compete at all.

In sum, there is growing global competition for a growing pool of high-skill labour, which will be increasingly important for growth, and the current US immigration system prevents the US from properly competing.

## The principles of immigration economics

In order to assess the best methods for attracting high skilled migration, it is necessary to understand the core calculations behind the decisions to migrate or to return home, and what restrictions are placed on them (e.g. visa quotas). This paper will take the most recent research from George Borjas (2014), the foremost expert in the economics of migration, in order to map the basic trade-offs of migration. It is generally accepted in the field of economics that migration is mainly motivated by wage differentials (Borjas, 2014), however net wage differentials must include costs of migration. Borjas famously adapted the Roy model of occupational choice to derive a number of equations describing the logic of migration. This paper is primarily interested in three: how can the migration trade-off be described, under what conditions do people choose to migrate, and under what conditions do migrants return to their home countries.

The decision to migrate:

$$\log w_{10} = \theta \log w_1 + (1 - \theta)(\log w_0 + k) \text{ (Borjas, 2014, p. 21)}$$

Where:

$\log w_{10}$ = the total log wage	$\theta$ = Fraction of total work life
$\log w_1$ = the host log wage	$k$ = rate of return of
temporary migration	
$\log w_0$ = the home log wage	

Conditions for migration:

$$\log w_1 - \pi_{01} > \log w_0 \text{ (permanent)}$$

or

$$\log w_{10} - \pi_{01} - \pi_{10} > \log w_0 \text{ (temporary)} \quad \text{(Borjas, 2014, p. 21)}$$

Where:

$$\pi_{01} = \text{time equivalent costs of migration}$$

$$\pi_{10} = \text{time equivalent costs of return migration}$$

We can therefore see that a worker will migrate if the net wage differential of permanent or temporary migration is positive.

Conditions for return migration:

$$\log w_{10} - \pi_{01} - \pi_{10} > \log w_0$$

and

$$\log w_{10} - \pi_{01} - \pi_{10} > \log w_1 - \pi_{01} \quad (\text{Borjas, 2014, p. 21})$$

Here we see that a worker will return if the wage differential of temporary migration is positive, and the wage differential of return migration is also positive.

Some conclusions can be drawn from this approach: any strategy to attract high skill labour must pay attention to wage differentials and these must be calculated in respect to time. Therefore, any analysis must include host country and home country policies and conditions, changes in the long term and the importance of the costs of migration. While direct costs, such as plane tickets, visa application costs and rent differentials, are clear, wage opportunity costs are more difficult but can be included with an appropriate time differential. However, personal preference is a far more difficult variable to account for. There are a plethora of factors with differing utility for different populations such as: how much the potential migrant values family and friends, and how one values differences in weather, food and culture. This difficulty in properly measuring the actual costs of potential migrants has been overcome in the literature by aggregating personal preference in the notation:

$$\pi = \mu_{\pi} + v_{\pi'} \quad (\text{Borjas, 2014, p. 10})$$

Where:

$\pi$  = Time-equivalent costs of migration

$\mu_{\pi}$  = Mean level of migration costs in the population

$v_{\pi'}$  = Random variable

While wage differentials can be assumed to be the main motivation for migration, this simplification is not a significant concern. However, they will become more significant as wage differentials decrease, and this study is also concerned with limiting return migration. Given that the top reason three reasons for return migration of high skilled migrants are: family, friends and cultural reasons (Han, et al., 2015), this study will also include some behavioural approaches to migration. In sum, the migration incentive structures, as described above, and the restrictions on migration, will be the main focus of this paper. This paper will now construct a methodology for analysis of the current tensions in the US system of immigration for high-skill labour.

## Theoretical approaches to modelling high-skill immigration

This paper will take a systems analysis approach to US immigration policy by constructing a policy analysis systems model of the immigration process which includes key actor preferences and medium-long term trends. This model will be used as a method of diagnosis, or “estimating what factors have the greatest leverage to change a specified

outcome" (Walker & van Daalen, 2013, p. 157), and as a method of planning for future trends. The systems analysis approach is appropriate when attempting to understand complex interactions of something which cannot be directly observed or measured. This is certainly the case for migration to the US, where we face uncertainty over long term trends and calculations of costs  $\pi$ . For example, it is reasonable to assume that the domestic industries of 3rd party countries will develop as a competing pull factor for migration, yet we can only estimate the extent of this growth and strength of the incentive.

The approach advocated by Walker and van Daalen (2013) is to first investigate the current system, or the 'base case', and then investigate the system under future conditions. This paper will slightly extend this process by including Thissen's recommendations for effective problem diagnosis by "including the critical actors' needs as additional outcomes of interest" (Thissen, 2013, p. 94). This is a key part of estimating the most important factors which determine high-skill labour immigration outcomes. Therefore, three variations of the systems analysis model will be presented: the base model, or the current situation; the model adjusted for mid-long term trends; and the model adjusted for mid-long term trends and critical actor preferences.

Within the systems model, a number of sub-models can be identified. In the case of US immigration policy, two specific sub-models will be explored: the policy arena model of US political actors and the economic incentive model of US industry. It is necessary to explore these sub models since they provide crucial explanatory power for system outcomes and operate on a much higher level of complexity than other factors. The policy arena of US political actors is an extremely significant sub-model which is functionally responsible for hard limits such as the cap on H-1B visas. An actor centred approach will be used to help sketch the bargaining process through an examination of key interests and positions. High-skilled migrants are normally defined as those with a tertiary degree (Koslowski, 2014) however, the US immigration system includes measures of industry recognition, academic recognition, international awards, and work experience.

The systems analysis approach is intended to develop an insight in order to enable "a decision maker to make knowledgeable choices among policy options" (Walker & van Daalen, 2013, p. 158). Therefore, once this paper has established a thorough systemic understanding of high-skill US immigration outcomes, policy options will be generated to reform the system. Firstly, a short discussion of immigration policy design will be presented to generate options, then the learning outcomes of the systems analysis will be applied to suggest the most effective policies. In light of the instability of outcomes from the US political actor sub-model, policy options will be generated for two outcomes: outcome 1, systemic change is possible i.e. bargain problems can be overcome; outcome 2, only iterative changes are possible i.e. bargaining problems are highly unlikely to be overcome.

As a practical extension of the policy options generated for outcome 2, an in-depth evaluation will be made of some of the major abuses of the H-1B system with clear policy



recommendations. This evaluation will tackle the myths of the H-1B process, the patterns of abuse and then present solutions as informed by the conclusions of this systems analysis.

This paper will now present a thorough examination of the current trends and legislation on high-skill labour immigration to the US.

## **The current US visa system for high-skill migrants**

This paper is primarily interested in modelling the decision of high skilled workers to apply for a visa in the US, as dictated by costs  $\pi$ , potential benefits  $k$ , and opportunity costs  $\log w_1$  and  $\log w_0$ . However, in the case of the US, where the yearly visa limits are normally reached in the first few weeks (Kerr, 2014), limitations are a crucial part of the system. Therefore, this paper will first present a detailed understanding of the current system of limitations, which are so crucial for visa outcomes, and the result of the political bargaining process and US industry incentive sub-models.

The current visa regime for international labour in the US is dictated by labour market demand within political limitations. The current system dates from a period of continuous bargaining following the Immigration and Naturalization Act of 1952 which defined three categories of immigrants: those with special skills and relatives of US citizens, remaining who have national quotas, and refugees. The act sketched the four basic principles of US immigration policy which still hold today: Firstly, that preference should be given to immigrants with needed skills; secondly, that families with links to the US should be able to reunify; thirdly, that immigration policy should maintain a racial balance/diversity; and lastly, that refugees should be protected.

The current structure of this system as it applies to high-skilled labour can be seen in Table 1 (see appendix A), whereby high-skilled workers have 3 major types of temporary visa and 3 major types of permanent visa. There are numerous categories of temporary visa, however the H-1B is by far the largest and most known. The H-1B visa requires a “valid employer-employee relationship” (USCIS, 2016a), or a job offer, the position must be at a level which requires a bachelor’s degree or an equivalent level of experience or higher, and it must be paid at the ‘prevailing’ market rate. Crucially, the employer must firstly petition the US Department of Labour to declare that the visa application meets the labour conditions, and then petition the US Citizenship and Immigration Services (USCIS) for an H-1B visa. Numerical limits for this visa can be seen in Table 1 and it is notable that H-1B sets aside 20,000 places for master’s degree level applicants. Permanent visas are granted according to 5 categories, with the 3 most significant shown in Table 1. Similarly, to the H-1B visa, some categories of permanent visa require a job offer and a petition must be made to the US Department of Labour by the sponsoring company to certify that:

“There are insufficient available, qualified, and willing U.S. workers to fill the position being offered at the prevailing wage”

“Hiring a foreign worker will not adversely affect the wages and working conditions of similarly employed U.S. workers” (USCIS, 2016b)

The total number of permanent visas awarded based on employment is capped at 140,000 annually. The visa process is frequently criticised for being extremely complicated and providing insufficient guidance over the selection criteria (Tabag, 2013) (Duncan, 2012). For example, the second employment category (E2) permanent visas and O-1 visa shown in Table 1 are reserved for ‘people of extraordinary ability’. The language on the USCIS website is typically normative when attempting to define this, using words such as ‘major’, ‘outstanding achievement’ and ‘distinguished reputation’. The selection of visas occurs via a ‘random selection process’ or lottery, whereby relative merit of applicants is randomised after a minimum threshold is reached. In this way, a skilled worker in the E3 category with 2 years of experience may be selected over a skilled worker with 10 years of experience.

Several tensions can therefore be easily identified under the current regime:

1. Numerical caps

The demand for employment visas far outweighs supply, and this includes demand from employers and migrants. As shown in Table 1, H-1B visas and permanent employment visas reached their yearly cap in 2015. The annual visa limits on these categories are repeatedly reached within the first few weeks of applications opening.

2. Visa priorities

The cap for permanent visas is far higher for family reunification than for employment, 480,000 versus 140,000, yet the family reunification yearly allocation typically remains below the maximum, at around 200,000, leaving over 50% of the quota unused.

3. Country quotas

Due to the per-country limits of 7% annually, there is a backlog of applicants from countries such as India, China and the Philippines. The effect of this is undetermined due to the excess supply of global high-skill labour to the US, however these restrictions are a possible choke point in the future.

4. Transaction costs

The cost of sponsoring an H-1B visa for a company can be up to \$10,000 per worker (USCIS, 2016c). Since demand outweighs supply, in the current system, this doesn’t present a limitation. However, before April 1st 2016, these fees were approximately 50% lower, therefore any effects of the price increase on visa demand from employers have not been felt yet.

5. Transparency and efficiency of the visa process

Categories of visa are numerous and the decision criteria are not clearly stated. The USCIS website is confusing and the organisation requires a significant amount of paperwork for each application. The application itself can take up to 6 months to process.

It is also clear that US employers are a key part of the visa process, for both temporary and permanent immigration, and thusly, have a large influence on the number of visas awarded for employment. Temporary visa migrants are largely dependent on continual employment to retain their visa and face a number of difficulties in changing employer since they must reapply for their visa, seek an employer who would be willing to sponsor the visa and to get their original employer to agree to the change. This paper will now begin to construct the 'base case' for systems analysis, utilising the observed patterns and tensions from the visa application process.

### **The 'base case'**

The construction of the 'base case' of US high-skill immigration for systems analysis should develop a clear understanding of inputs, outputs and relationships. The 'base case' mostly focuses on key actors and institutions which influence the output, namely the number of high-skill visas awarded. However, two sub-models will also be examined since we are interested in the outcomes and interests of specific communities which influence the number of visas awarded. These two sub-models are the policy arena model of US political actors and the economic incentive model of US industry.

#### **Us political actors – sub model**

The immigration system in the US is determined by congress and is often in response to leadership from the president. US political actors determine opportunities for permanent stay, barriers to entry or stay and the conditions regulating stay, which are large determinants of both the cost of migration  $\pi_{01}$  and the costs of return migration  $\pi_{10}$ . In addition, immigration regulations, such as minimum paid wages necessary to receive a visa, impact the wages  $\log w_1$  which are here presumed to be the primary motivation for migration. The most notable recent attempt to reform the US visa system was the STEM 1Jobs Act (2012), which reserved 55,000 permanent visas for graduates in STEM fields from US universities at the Masters level or higher. Democrats largely opposed this bill in the House and refused to put it to a vote in the Senate, whereas Republicans largely voted in favour of this bill. While many Democrats, including President Obama, support the idea of high-skill immigration, they have strong commitments to wider goals of immigration policy. The 55,000 visas would have replaced the Diversity Program and therefore were seen as zero-sum for the Democrats. However, the majority of Americans from both parties support high-skilled immigration (Pew Research, 2013), therefore a consensus position can likely be found.

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This crucial sub-model will therefore be examined with a focus on congressional voting behaviour, but also taking into account the impact of interest groups. It will then make a brief examination of the policies of the current president and the four most likely candidates for president in 2016. It will finally present some conclusions of this model and how US political actors impact our systems analysis.

Beginning with the most comprehensive study of voting behaviour in the US Congress, Facchini and Steinhardt (2011) show that the labour market structure of US constituency overwhelmingly determines voting behaviour. They found that “representatives of skilled labour abundant constituencies are systematically more likely to vote for liberalizing unskilled immigration” (Facchini & Steinhardt, 2011, p. 742) with the logical structure that complementary immigration is less of a threat to their constituents than competing labour. In the context of partisan politics, immigration policy is endogenously created by the composition of parties. Those with a larger proportion of unskilled supporters are therefore likely to oppose immigration liberalisation of unskilled immigrants (Llavador & Solano-García, 2011). In addition, studies have observed network effects of established communities of immigrants who can both motivate policy makers (Facchini & Steinhardt, 2011) and industries (Facchini, et al., 2011). In sum, considering that many Democrats mostly control the East/West coast concentrations of highly skilled populations and that nearly half the votes for Democratic candidates come from minorities (Pew Research, 2013). It can be concluded that Democrats are likely to be more immigration friendly in general than Republicans. However, as seen by the Democratic opposition to creating STEM visa exceptions, the more business friendly Republican Party is more likely to support a transition from quotas for family/diversity to employment preference. This could also be seen in the proposed Comprehensive Immigration Reform Act of 2007 which had a STEM bias, a bias to shortages of labour, and would introduce a points system. This reform was also opposed by major Democrats such as Barack Obama and Nancy Pelosi due to the perceived damage to family re-unification.

US special interest groups can also significantly affect outcomes, and each industry in America spends \$1.1 million per year on lobbying on average (Facchini, et al., 2011). While unions have a measurable impact on low-skill immigration, high-skill immigration lobbying is dominated by tech businesses, such as Google and Facebook, along with major universities. Top two spenders on lobbying for immigration reform 2001-2005 were educational services and engineering and computer services (Facchini, et al., 2011). These two sectors also had the largest number of allocated visas, with educational services the larger of the two. A study from Facchini et al. found that, controlling for industry size, output and industry specific unemployment, “a 10% increase in the size of lobbying expenditures by business groups, per native worker, is associated with a 3.1–5.0% larger number of visas per native worker” (2011, p. 123). Also, networking-like effects can be seen in industries with larger numbers of immigrants, who are more likely to lobby for more visas.

Industry representatives also successfully opposed the 2007 reform due to the introduction of a points system.

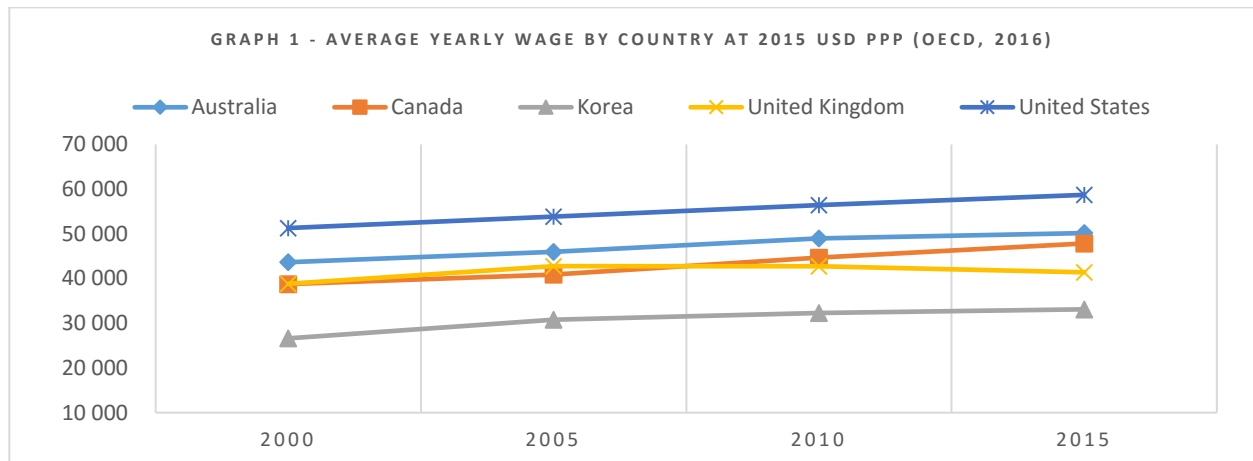
While President Obama is broadly in favour of high-skill immigration, looking past the 2016 election shows remarkable variation: Donald Trump currently opposes immigration in general with specific mention to the H-1B program (Trump, 2016). Hillary Clinton's reform proposal does not take an anti-skilled immigration stance, yet its strong focus on family reunification suggests that she would oppose a re-prioritisation to skilled workers and that she has no ambition for a complete overhaul of the system (Clinton, 2016). This brief analysis of policy manifestos shows that neither of the presidential candidates are stating high-skilled immigration as a priority.

Some conclusions therefore can be drawn from this sub-model. While there is broad public agreement on high-skill immigration, there is very little political support for a radical shift in immigration policy. Republicans are more likely to support a transition from family based immigration to employment based. However, the Republican frontrunner in the 2016 presidential election shows opposition. Democrats may be more likely to support raising certain caps and liberalising the visa process, yet not at the cost of family based immigration. US special interest groups do make an impact on voting outcomes, as does the skill composition of residents and number of immigrants in each constituency. This suggests that the interests of these groups, which are primarily industry representatives in the case of high-skilled immigration, must be factored in as a likely influence on any reform.

#### **US industry – sub model**

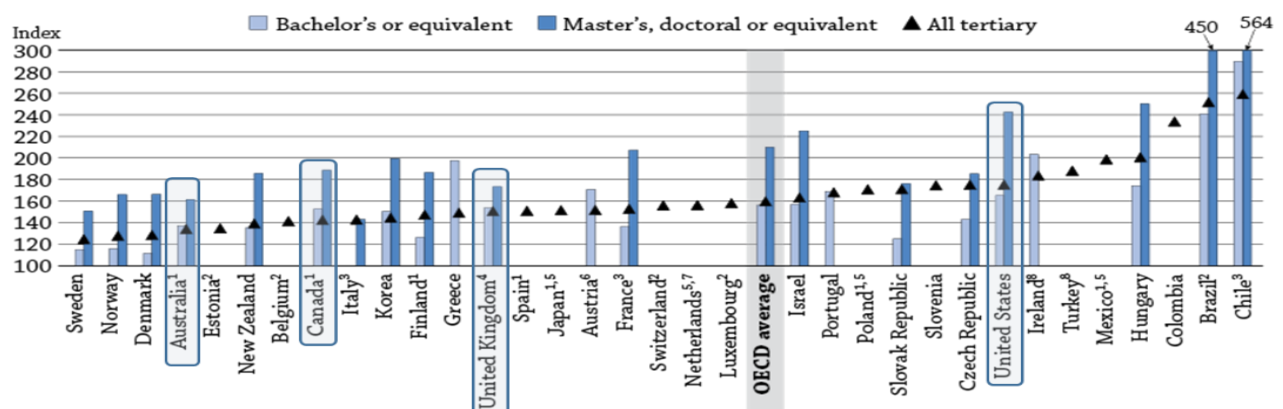
US Industry is another major determinant of high-skilled migration to the US since the US visa system is based on labour market demand. As this paper has shown, every employment visa requires either a petition on behalf of the employer or a guaranteed job offer (See Table 1, Appendix A). However, US industry is also the pull-factor for high-skill labour due to wage effects  $\log w_1$  and correlated variables, such as job satisfaction working for the most cutting edge companies. However, companies can also impose their preferences as seen in the 2007 reform debate. In addition, US based companies are often accused of abusing the US visa system to artificially lower wages. This analysis will look at the relative importance of the high-tech sector, the main companies/industries involved, significant groupings of industries often referred to as clusters (Slaper & Ortuzar, 2015) (Schiada, 2013), and finally costs  $\pi_{01}$ , wage distortions and other issues.

It is firstly necessary to establish the crucial advantage that US industry currently affords the US in terms of global competition for high-skill labour: wage differential. While very little data is available for cross-country high-skill salary comparison, the US has one of the highest average salaries in the world and one of the highest relative rates of remuneration for those with tertiary education. As shown in Figure 1 (OECD, 2016), the US can currently offer higher average incomes to potential migrants, around 20% higher than most OECD countries.

**Figure 1: Average yearly wage by country at 2015, USD PPP**

Source: Own adjustment based on OECD data.

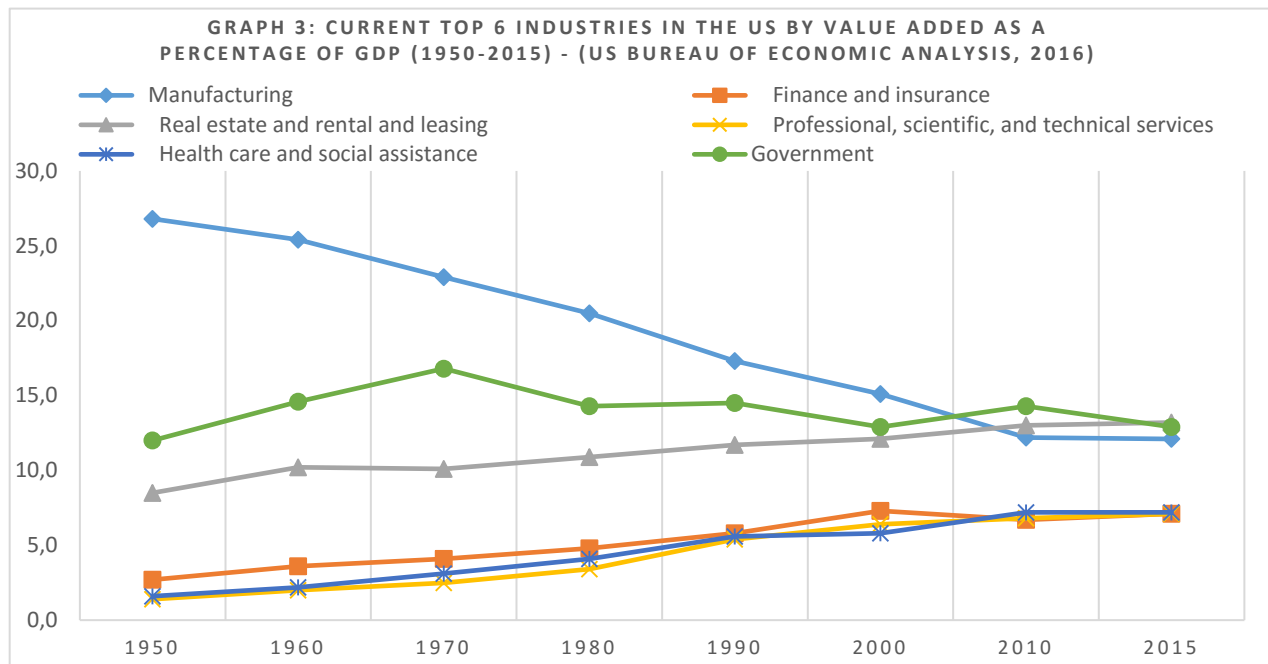
While this only provides a general overview, OECD data on earnings of the tertiary educated workers (OECD, 2015) indicates that high-skill workers in the US will earn much more than the average relative to competitors such as Australia or Canada. This data is shown in Figure 2, and strongly suggests that high-skill workers in the US enjoy a significant wage differential from other OECD countries.

**Figure 2: Relative earnings of tertiary-educated workers, by level of tertiary education 2013**

Source: Own adjustment based on OECD data.

The largest 6 industries in the US can be seen in Figure 3 as a percentage of GDP.

**Figure 3: Current top 6 industries in the US by value added as a percentage of GDP( 1950 – 2015) – (US Bureau of economic analysis, 2016)**



Source: Own adjustment based on OECD data.

and together comprise 60% of total GDP (US Bureau of Economic Analysis, 2016). Since 1950, healthcare, finance, and professional services have steadily grown in importance, while manufacturing has declined drastically. The US Bureau of Labour Statistics identifies 33 high-tech sectors<sup>1</sup> which mostly fall within these top 6 sectors of the US economy, such as: electrical components, industrial machinery, oil and gas extraction, federal government and scientific research (Wolf & Terrell, 2016). These high-tech sectors produced 23% of total output in 2014 (Wolf & Terrell, 2016) and can also be seen as key drivers of productivity growth in other sectors that utilise innovations. Short-term projections show that high-tech sectors will continue to grow in the future: Financial services and professional and business services are predicted to almost double in output 2010-2020 (Carnevale, et al., 2013); whereas manufacturing will only experience 50% growth. In terms of employment, education, healthcare, professional business services, and financial services are all predicted to grow by 25-28% 2010-2020, while STEM occupations are predicted to grow by 26% (Carnevale, et al., 2013). In contrast, blue collar jobs are predicted to grow by 8% in the same period. In sum, it is clear that sectors requiring high-skill labour comprise an extremely large percentage of the US's GDP and, in the short term, will become increasingly important.

<sup>1</sup> High-tech sectors are defined as those sectors with "high concentrations of workers in STEM" (Wolf & Terrell, 2016, p. 1)

Crucially, many high-tech sectors face a shortfall of skilled workers in the domestic pool. Since 1989, there has been an 82% growth in jobs requiring bachelor's degrees or higher, and a 14% decline in jobs requiring high school level education or less (Carnevale, et al., 2013). As already stated, Carnevale et al. (2013) project a 5-20 million shortfall of educated workers by 2020. Many high-skill sectors in the US are therefore highly reliant on foreign born skilled labour, who accounted for 29% of the growth in the US workforce with bachelor's education 1995-2008 (Kerr, et al., 2013). In particular, foreign born labour comprises 32% of computer programmers and 24% of engineers (Migration Policy, 2016).

Although the vocal support for high-skilled immigration from major technology firms such as Google, Microsoft and Facebook may give the impression that they are the biggest recipient of foreign high skilled labour. As shown in Table 3 (see appendix B), the biggest players are IT and engineering consultancy firms such as Infosys and Tata Consultancy Services who dominate the H-1B visa application process, simply by sponsoring the most applications (New York Times, 2015). Other significant recipients of H-1B visas include: technology companies, such as Intel, Apple, and Microsoft; legal consultancy firms, such as: Deloitte, PwC and Ernst & Young; software companies, such as Facebook and Google; and banks such as JP Morgan and Goldman Sachs (MyVisaJobs.com, 2016). Traditional companies are much more prominent in the permanent visa application process as shown in Table 3 (see appendix B). In the short term, these employers will only demand more high-skill immigrants to feed their growing industries.

Looking at the location of the awarded H-1B visas, this paper can identify a link with identified clusters of high-tech industry, therefore it is important to examine the role of industry clusters as a pull-factor for immigration. An industry cluster is a "regional concentrations of related industries" (Slaper & Ortuzar, 2015, p. 7) which creates a competitive advantage for firms located within that cluster. Firms in this area are so well supported that they create a multiplier employment effect within the region, thereby building demand for more high-skill labour. On the demand side, these clusters provide more job opportunities and higher wages due to experience effects which provide a clear incentive for high-skill immigration. In addition, there are also indeterminate status effects of working in a 'cutting edge' community such as Silicon Valley. Locations of major high-technology clusters include New York, Dallas, San Jose, Washington, Chicago, Los Angeles, Portland, San Francisco, San Diego, Silicon Valley and Boston (Schiada, 2013). This coincides with the largest regional recipients of H-1B visas (Brookings, 2015), confirming the hypothesis that clusters are a major source of demand from companies. The annual Dice survey of tech salaries ranks these clusters as paying the best wages for employees in the technology industry, confirming, at least for the tech sector, that there is also a strong pull-factor for immigrants from these clusters (Dice, 2016).

In sum, the US market for high-skilled labour is heavily concentrated into clusters with comparatively high wages. The pull factor for immigrants from wage differentials are clear. Where tech workers in the most competitive clusters in the US can expect to earn



approximately \$100,000, this is approximately 30% higher than the UK (Business Insider, 2015) and orders of magnitude higher than India or China. In addition, consultancy firms are major recipients of H-1B visas while high-tech industry and legal/financial companies provide the bulk of demand. As previously mentioned, US industry is not just a model of demand, but also a political actor in aggregate through lobbying and hiring practices. Therefore, it is also necessary to examine tensions in the current system and possible reactions to future changes.

It is clear that “Employers favoured the extant demand-led, decentralized H- 1B system.” (Duncan, 2012, p. 141), this is due to their level of control over the process and their employees; who are largely dependent on them for visa status. This is evident both from their pattern of lobbying for higher visa numbers and opposition to systemic change, such as the 2007 Reform Act. However, current visa practices may undermine the pull factor for US industry in the future since the temporary visa system is rampant with labour exploitation practices which will be discussed in detail in connection to the H-1B program. In sum, US industry has a direct impact on pull factors both through development of industry clusters to drive higher wages, and through abusive employment practices which introduce new costs for potential migrants. In addition, US industry must be taken into account as a political actor which wants to extend the scale of the current demand-led immigration system, or at least maintain some control over the process.

#### **Foreign residents**

Foreign residents are those foreign-born, high-skilled workers who do not currently have a temporary visa in the US. Foreign residents face all of the costs of immigration to the US, but face lower costs of uncertainty in the visa process since they do not have to relocate upon rejection. The primary concern for this group is wage differentials, net of the costs of migration, as stated in the equations  $\log w_1 - \pi_{01} > \log w_0$  and  $\log w_{10} - \pi_{01} - \pi_{10} > \log w_1 - \pi_{01}$ . These equations will be decided based on a comparison between average home country, high-skill, wages and global wages for high-skill labour, minus the costs of emigration. Once they decide that emigration will be a net benefit for them, they must decide which country to emigrate to, based on: industry incentives, relative emigration costs, country incentives and visa restrictions. When looking at emigration costs, network effects of current populations of migrants can reduce many of the indirect costs of migration by providing a similar culture to their home country and reducing information costs. The US's multiculturalist immigration model with the world's largest stocks of immigrants has a clear advantage here over other states, though globalisation will eventually reduce this advantage.

The most common source of high-skill immigrants to the US can be seen in Table 2 (see appendix B), which shows the numbers of different types of employment visa by nationality. By far the largest source is India, followed by China, the Philippines, South Korea and

Mexico. With the exception of South Korea<sup>1</sup>, all of these countries have an average wage 10-40 times smaller than the US (PWC, 2013). The salaries of high-skill workers in these countries will likely be far higher than the average, yet there is insufficient data for cross-country comparison.

The most common category of visa for high-skill workers to apply for is non-immigration for a number of reasons. Firstly, temporary residents have a strong advantage over foreign residents in the permanent visa application process, since their current US employer can sponsor them: "The H- 1B visa is thus a gateway visa to gaining permanent residency in the United States" (Duncan, 2012, p. 60). Secondly, the decision to permanently emigrate must include a determination of all future costs such as cultural incompatibilities, and therefore a better estimation can be made once one is already working in the US. Thirdly, the permanent immigration visa can cost up to \$1000 with no proper expectation of success since the visa system is so opaque, this is a relatively higher burden for those working in India than those already working in the US. In sum, foreign residents generally apply for temporary visas and wage differentials are the definitive motivating factor.

### **Temporary US Residents**

Temporary US residents are those foreign-born high-skilled workers who currently hold a temporary visa in the US and may either apply for a renewal, apply for a permanent visa or return to their home countries. It is also possible that they would migrate to a 3rd country, however this would entail paying the costs of migration again and is thusly rare. Surveys of high-skilled migrants who return home confirm the dynamic that increasing domestic opportunities and quality of life are the most important reasons to return home (Wadhwa, et al., 2009) (Kerr, 2014). Temporary visas, such as H-1B, leave immigrants dependent on employers who can exploit them and deny them job security. Although temporary residents may continue to act according to economic incentives through competition dynamics between US industry, home country incentives and home industry incentives. The decision for return migration is also a function of visa system restrictions and non-economic factors. Surveys of STEM graduates in the US found that, for those who decided to return home, job opportunities were 4th in importance to friends, family and culture (Han, et al., 2015). In addition, all three of these studies found the visa system to discourage staying in the US due to a high degree of uncertainty, albeit they put less importance on this factor than family, culture or wage differentials. For STEM graduates in particular, there is an Optional Practical Training extension of up to 29 months for those with a student visa, which one can use to apply for an H-1B. This limit fluctuates according to the political situation however. In sum, temporary US residents are primarily motivated by wage differentials to renew their visa or apply for permanent immigration however they are limited by visa insecurities and limits, and are often exploited by US employers. Behavioural studies of

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<sup>1</sup> Which has approximately half the average wage of the US.

return migration can provide a roadmap to better integration and reducing the number of returnees.

### **Home Governments**

Home governments can provide incentives for high-skill immigrants to stay or to return. There are currently 18 countries which have programmes to promote return of STEM majors (Han, et al., 2015) and some governments, such as Serbia or Brunei, condition state scholarships for higher education study to working domestically for a period up to 10 years. Governments can also partner with industry to provide domestic incentives for high-skill labour to stay.

### **Home Industry**

Home industry directly impacts the calculation of migrants to leave a country or return to it for financial reasons  $\log w_0$ . Countries where the domestic industry offers a high return to skills will lead to return migration or lower numbers of migration.

### **3rd Country Incentives**

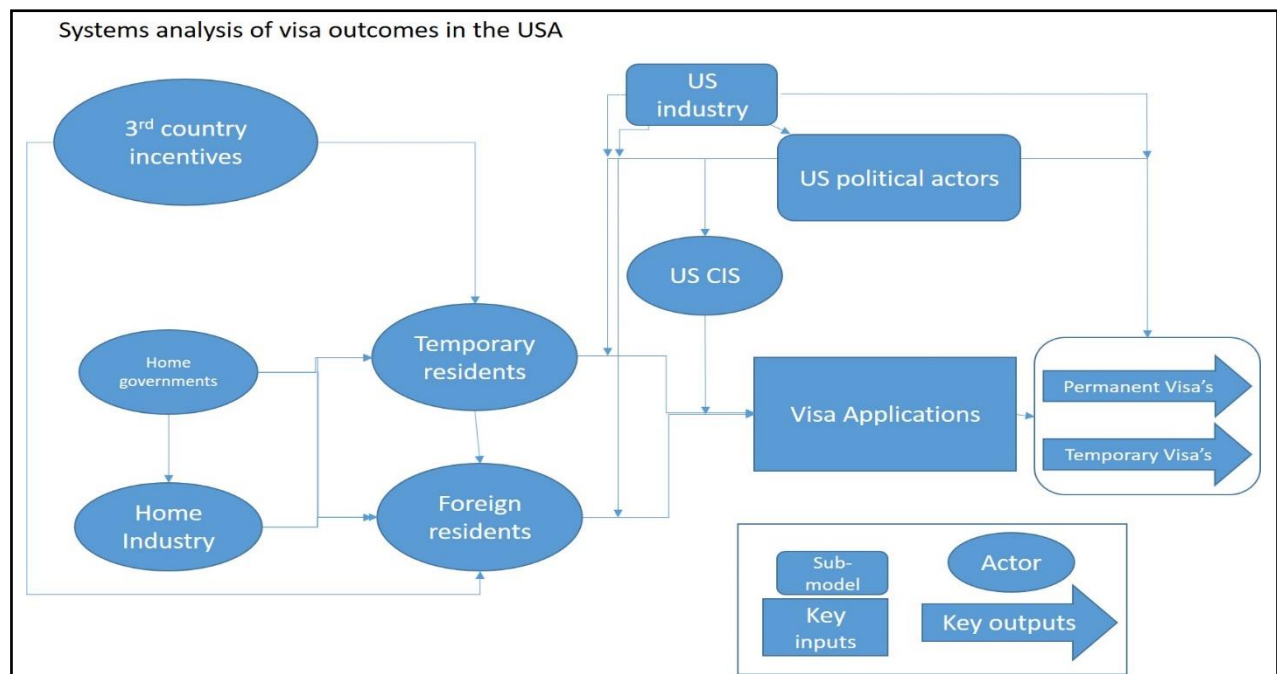
3rd Countries compete with the US to attract global flows of high-skill labour whereby the primary mechanism is that “countries offering a higher return to skills attract relatively more skilled immigrant flows” (Borjas, 2014, p. 25). As shown in Figures 1 and 2, the US is currently the world leader in this type of competition. However, the size of immigrant networks already established, transparency of visa systems, relative lack of visa restrictions and factors of personal preference all play a role. Australia and Canada are typically discussed as competitors to the US with more attractive points-based immigration systems which award a larger percentage of employment based visas (Koslowski, 2014). These systems are also far more transparent than the US system, awarding a specific number of points for specific desired traits such as English language ability or level of education. Points systems are also seen to take much less time to process applications because of this transparency. There are also significant high-tech clusters of industry in Europe such as London or Dublin.

The success of this approach can be clearly seen in the growth in the numbers of high-skilled immigrants to these countries: In the last 10 years, the number of skilled migrants to Australia has almost doubled (Australian Government, 2014b) and the numbers of temporary-high skilled migrants to Canada has also doubled (Government of Canada, 2014b). Similarly to the US, Canada has a cap on permanent immigration therefore the numbers of permanent economic immigrants have remained constant; albeit at a much more desirable 2.5:1 ratio to family based immigration. Yet the Canadian system utilises category caps for individual professions that can be easily changed to suit the current economy, such as caps of numbers of civil engineers or financial officers, thereby allowing for much more control over the intake.

### The model

This paper has described the factor inputs for high-skill immigration to the US including various linkages and magnitudes of effect. From this, the base case model has been constructed showing actor type and direction of influence.

**Picture 1: Systems analysis of visa outcomes in the USA**



Source: Own adjustment.

This model provides the policy maker with a detailed overview of the dynamics of high-skill immigration, however it provides very little insight into policy reform. These factors are not dynamic and the interests of key actors will influence the likely outcomes. Therefore, this model must be revised to include both long term factors which will influence calculations of magnitude,

and key actor preferences which are crucial for the bargaining process of reform implementation.

### High-skill immigration in the medium-long term

In estimating the long term changes in our factor inputs, it must be emphasised that this paper's methodology favours an excellent grasp of immigration dynamics over accuracy. As such, long term trends will be applied to each of our factors to inform more effective policy prescriptions. Medium-long term will here refer to the next 15-30 years. This paper will first discuss those trends which are clear and then briefly analyse those factors whose trends are unclear.

#### Home industry and home governments

Considering the swift growth of the main source countries for high-skill immigration, India, China and the Philippines, it can be reasonably stated that the power of home industry and home governments to offer economic incentives for high-skill labour to stay/return will drastically increase. Wage projections from PwC predict that 2011-2030, real wage growth per annum in the major source countries for the US will be approximately 6-8%, in comparison to less than 2% in the US (PWC, 2013). This is consistent with standard Heckscher-Ohlin-Samuelson trade model, whereby free trade with globalisation will reduce differences in factor prices, i.e. wage. It is also consistent with standard theories of development, whereby developing countries experience faster productivity growth than developed economies; and therefore faster wage growth. The wage differential of migration is likely to remain positive, since productivity increases will have diminishing returns as development continues, yet the smaller wage differential will do much less to offset the costs of missing family/culture included in  $\pi$ .

### **3rd Country Incentives**

Similarly, wage growth for competitors such as the UK, Germany and Canada will be higher than in the US and the US's main competitors for high-skill immigrants are projected to have a higher average wage than the US by 2030 (PWC, 2013). While this analysis does not provide evidence that wages in the high-tech sector in these countries will surpass the US, at the very least it certainly suggests that the wage differential will be reduced. Competition between countries for high-skill immigration will certainly become more intense as other countries develop significant clusters of industry which can compete globally and human capital demands for all countries are likely to increase.

### **Foreign residents**

With improvements in education provision across the developing world, the pool of high-skill labour will also likely be much larger in the future.

These trends are relatively clear and some tentative conclusions can be made: firstly, US industry should continue to develop in order to offset increased competition from abroad. Secondly, that declining wage differentials means that non-wage factors such as the uncertain visa process will become increasingly important as a determinant of competition for high-skill labour. Thirdly, that the visa system in the future will be under even higher pressure from a growing global pool of high-skill labour. In this context, with an expansion in the number of high-skill immigrants, the US will decline in competitiveness in comparison to countries that do exploit this pool of high-skill labour.

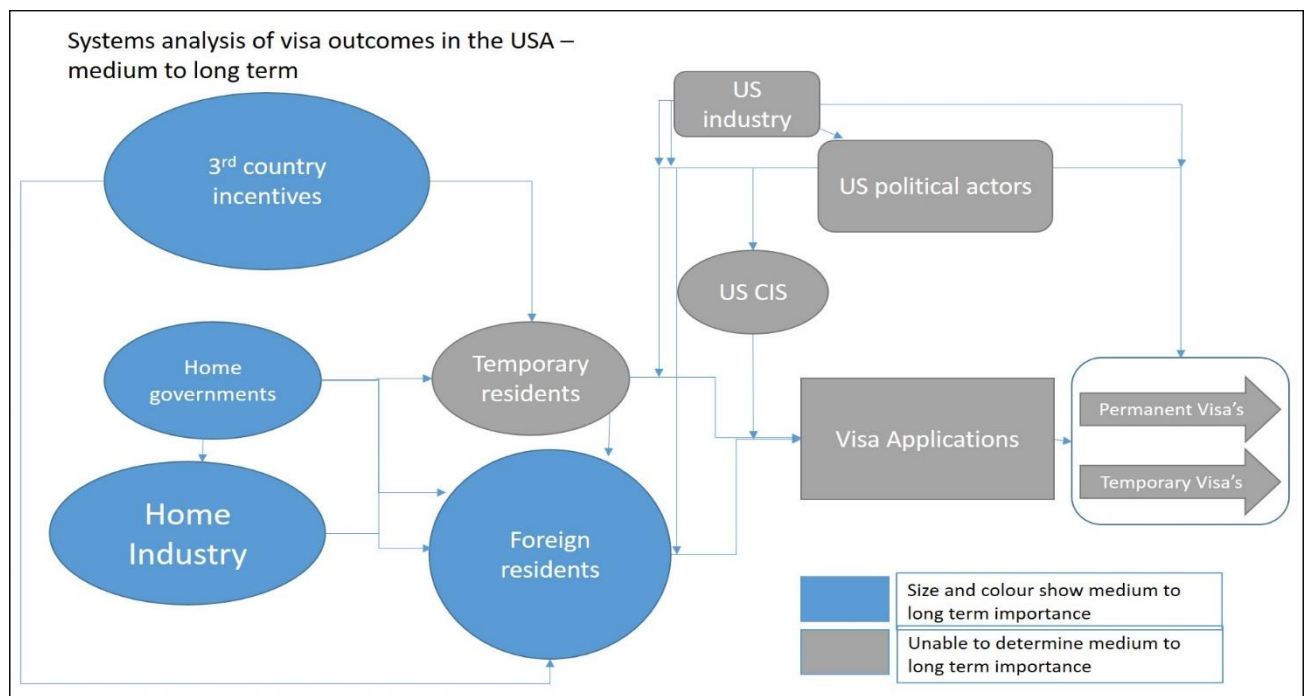
However, many other factor inputs are uncertain in the long run. For example, the growth of US industry is certainly likely, yet the magnitude and if they will fuel this growth through immigration is unknown since increasing difficulties in being awarded visas may de-incentive businesses to rely on foreign high-skill labour. In this way, a large percentage of future growth will be endogenous and difficult to include in this analysis. Nevertheless, with other factors held constant, if US industry can source a competitive number of high-skill

workers, it will be much better placed to maintain its place as a world leader. In this way, US industry can be seen to function as our main dependent variable, the growth of which is our positive policy outcome. Some conclusions can also be drawn from this. Firstly, that the numbers of visas awarded should be expanded to facilitate growth, and secondly, that US political consensus on the need for reform should be encouraged through education and long term consensus building.

#### The medium-long term model

The medium-long term model shows a number of increased challenges to US dominance of high-skill labour flows, however also increased opportunities due to the larger pool of high-skill labour. Selection standards can be easily raised and labour can be better selected to fit the specific needs of the US economy.

**Picture 2: Systems analysis of visa outcomes in the USA – medium to long term**



Source: Own adjustment.

#### High-skill immigration in the medium-long term including actor preference

While the medium-long term model shows what structural factors immigration policy should take into account, it provides little explanatory power as to how actor preference should be taken into account in order to achieve reform. Successful policy reform is the result of a complex bargaining process which depends on coalition building, patterns of agenda setting and the institutional environment. This paper will focus more broadly on some of

the conclusions from the sub-model analyses and how they interact within the systems analysis.

### **US Industry**

US industry has a direct impact on visa outcomes in the current system and in the medium-long term, it will also have a huge influence on both temporary and foreign residents, and US political actors. It acts as the main pull-factor, a vital player in the current visa system and an important interest group for US political actors. It cannot be said to be a veto player since it has no legislative power, yet it has a large influence on veto players.

US industry is concerned with maintaining control of which skills are desired by the immigration system, keeping labour costs low and raising the number of visas awarded.

### **US political actors**

US political actors are not as unitary as US industry therefore future perceptions of desirable visa outcomes from US political actors cannot be reliably predicted and included in the model; yet they will be crucial for the success of reform. Nevertheless, although the current pattern of US political interest described above may change in the long term, theories of path-dependency suggest that the Democratic Party is unlikely to significantly withdraw from support for family-based immigration. In this way, proposals under a Democrat dominated congress should be sensitive to family-based immigration, while proposals under a Republican dominated congress should seek to reduce family-based immigration. However, as studies of congressional voting behaviour have shown (Facchini & Steinhardt, 2011), the structure of constituencies heavily influences voting behaviour. In this way, the growing percentage of Americans from a minority background (Pew Research, 2013) will become an important new factor in the immigration debate. Whether this new voting block will favour high-skill or family immigration is largely a function of education, both on the relative benefits of high-skill immigration and of the voters themselves, who may prefer complementary skill-level immigration as opposed to competing.

### **Foreign Residents**

As already discussed, these potential migrants have not borne the costs of immigration yet and in the long term have a larger choice of destinations. This means that future migrants can afford to be more selective and as a key determinant of immigration outcomes, their preferences should become more important for future systems. While, contrarily, the supply of high-skilled foreign labour will increase, reducing individual bargaining power, the best educated tranche of this labour pool, and therefore most desirable tranche, will still benefit from the larger choice of destinations.

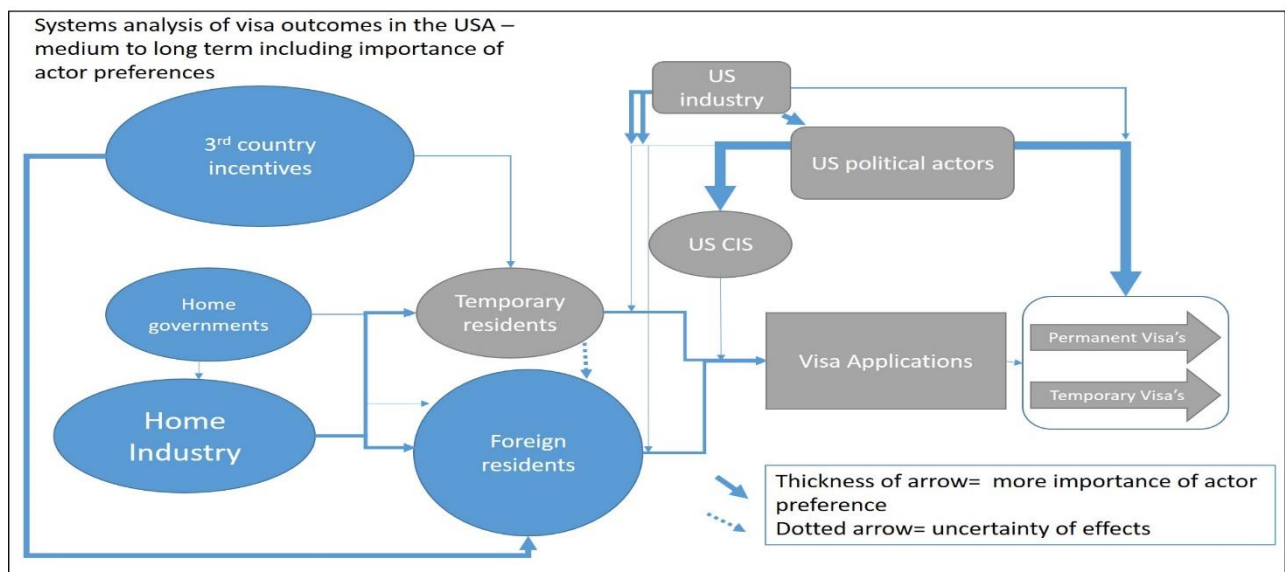
### **3rd Country and Home Industry Incentives**

Successful immigration reform cannot be judged in isolation but must be measured against competing measures abroad under the model of global competition for human capital. In this way, the US should take into account which types of high-skill labour the US will be competing for based on projections of industry growth of major competitors. Major competitors can be judged as those who have both large economies and high wages, along with relative cultural openness to immigration. Australia, the UK and Canada have been 3 traditional competitors, however Germany, China, Singapore, Japan and Taiwan may increasingly compete for global high-skill labour in certain industries. Similarly, Home Industries will increasingly attempt to prevent brain drain effects and this should be factored into which strategies the US will use to compete.

### The medium-long term model including actor preference

The medium-long term model including actor preference shows that future reform must become far more competitive internationally, yet is strongly dependent on domestic factors such as industry preference and party politics. This suggests that systemic change is necessary, yet unlikely to succeed.

**Picture 3: Systems analysis of visa outcomes in the USA – medium to long term including importance of actor preferences**



Source: Own adjustment.

## Discussion

A systems analysis of high-skill labour immigration to the US shows that the US will face a much greater deal of competition for high-skill labour in the future, from both 3rd countries and home governments/industries. The pool of high-skill foreign labour may react to this growth in global demand by taking a greater range of factors into account. This paper essentially argues that in the context of growing global competition and decreasing wage differentials, those qualitative factors which currently influence the model of return



migration will become increasingly important. These include: ease of visa process, easy cultural adaptability, perceived openness of the country and workers' rights. Although this paper began with a traditional economic approach, it is clear that outcomes are increasingly the result of qualitative factors, where the fields of public policy and behavioural economics hold more explanatory power. In this way, this paper applies the conclusions of Wadhwa et al., who were reacting to current return migration, to the medium-long term situation for attracting high-skill immigration:

"The United States will need to develop a new approach that entails coordinated efforts to address immigration policies, professional-development opportunities, and talented immigrants' concerns over family welfare and quality of life." (Wadhwa, et al., 2009, p. 6)

It is certainly possible that as the pool of high-skill foreign residents grows, their ability to bargain for better treatment will be diluted, however, this is a relative function to growth in demand and ignores the diversity of the 'high-skill' labour category. Prudent policymaking should view high-skill labour as a valuable resource to compete for, rather than relying on supply outweighing demand as a justification for maintaining the current system. Similarly, the US should attempt to compete for the best workers to support their economy, as is currently done in Australia, the UK and Canada, as opposed to anyone who fulfils the minimum qualifications.

It should be noted that reform of the US education system to encourage tertiary enrolment, STEM in particular, can complement reform of the immigration system, however this is beyond the scope of this policy paper.

It is also notable that the systems analysis approach in this paper provides a compelling narrative of the future of high-skill immigration. By sacrificing numerical accuracy for a general overview of trends it provides a clear roadmap for future reform while being adaptable to changing conditions. Quantitative analysis should be used to support the scale and scope of reforms. The current main nationalities of high-skill immigration to the US can be seen in Table 2: Indian, Chinese, Philippine, South Korean and Mexican. The networked pattern of migration, along with rapidly expanding pools of high-skill workers in India and China, suggest that these will continue to be key sources of high-skill labour. In this way, targeted policies today should focus on these nationalities. However, the US can also take a proactive approach to encouraging high-skill immigration from different parts of the world and, in the long term, new source of high-skill immigration may emerge. The systems analysis developed through this paper should provide a dynamic way to respond to these unpredictable changes.

## **Conclusion and policy prescriptions**

This paper has thoroughly explored the dynamics of high-skill immigration to the US using a public policy systems analysis approach. The system was then analysed in the medium-long term and then revised into a final model which factored in actor preferences.

It has been argued that the US immigration system does not provide sufficient high-skilled labour to support the US economy, and that this will be increasingly harmful for the US economy. The current system allows for levels of high-skill immigration similar to economies 1/10th of its size and will increasingly fall behind in global competition for human capital due to structural flaws in the system and failures of implementation. This paper has established the current and future importance of the high-tech sector for the US economy, and has evidenced that this growth will not be properly supplied with high-skill workers by the US education system, or by the US immigration system. It further concluded that wage differentials will likely decrease, giving the top tranche of high-skilled labour a far greater choice of destination and raising the importance of qualitative differences between host countries. In this context, the US's restricted, confusing and often hostile immigration system will increasingly stand out from countries such as Canada, the UK, Germany and Australia, whose immigration systems are far more transparent and prioritise employment based immigration. Finally, the US immigration system makes insufficient differentiation between different tranches of high-skill immigrants, prioritising US industry sponsorship and minimum standards, as opposed to targeting the very best applicants through points allocation for skills.

The systems analysis approach found a number of frictions in the US visa system which present a barrier to further high-skill immigration: The low numbers of visas available due to a competing priority for family immigration. The opaqueness of a confusing visa system where vague definitions and lottery-like distribution of visas makes it hard for potential immigrants to properly plan for the future. The inflexibility of labour under the current regime due to the reliance on one company for the visa and the incredible difficulty of switching that employer. These frictions were found to have originated from the political bargaining process and US industry preferences.

This paper also found that the US will face far higher competition for high-skill labour from developing home industries, an increasing number of 3rd party countries and concerned home governments, who wish to prevent brain drain. If the US does not reform its immigration policy, the US economy may lose its position as the world leader in high-tech industries. Once more it is notable that this outcome would be best achieved in concert with domestic education reform.

What has emerged from these conclusions is the clear need for reform and this section will now generate a series of policy prescriptions: One clear policy prescription is for US industry to maintain its advantage in wage differential. One approach which emerged from the discussion is the development of technology clusters:

Development of US industry clusters: The US government should cooperate with US industry to produce technology clusters which maximise experience and location economies to ensure that US industry offers competitive wage incentives for high-skill labour.

**Targeted incentives:** The US should directly compete with 3rd party countries and home industries/governments to incentivise high-skill immigration beyond simple wage differentials. Simple incentives such as assistance with integration, language lessons and welcoming/networking events can be combined with financial incentives. Integration efforts can be included in the requirements for sponsoring businesses. These incentives should be targeted by sector and country, and competitive to other international incentives.

However, this is a very narrow approach to competition, which may not be sufficient in the future, therefore this paper concludes that systemic change of the visa system is the best way to compete internationally in the medium-long term.

The objective of this paper is both to provide a best case roadmap for reform, and practical options for reform in the face of political gridlock. Therefore, policy options have been generated based on this systems analysis for two situations: firstly, that bargaining problems within and between the two sub-models can be overcome, and secondly, that bargaining problems cannot be overcome and systemic change is not possible.

#### **Bargaining problems can be overcome: hybrid demand-led points system**

Almost every single study examined during this policy analysis advocated that the US change to a points system (Duncan, 2012) (Kerr, 2014) (Koslowski, 2014) (Wadhwa, et al., 2009) (Tabag, 2013). However, while points systems have many advantages, they can also result in under-utilisation of skills since they are not explicitly linked to employer preferences (Somerville & Walsworth, 2009). This paper therefore advocates the creation of a hybrid demand-led points system which would combine the efficiency of a points system for attracting high-skill labour, with free market principles that ensure proper utilisation of that labour. In this way, desirable skills can be targeted through points allocation, leading to better skilled immigrants; as opposed to being diluted by the more numerous visa applications from consultancy companies such as InfoSys, whose employees generally only meet the minimum requirements (Hira, 2015). In addition, with points for English skills and other personal attributes, candidates will likely be better able to adapt to the US, leading to lower rates of return migration. A further advantage of this system is that it removes the need for hard caps, which have evidenced various issues with flexibility, the skill requirements can simply be increased or decreased according to demand, supply and desirable policy outcomes. This can be implemented with direct and indirect industry co-operation:

Firstly, a points category can be created for showing evidence of a “valid employer-employee relationship” (USCIS, 2016a) in positions which require a degree. This takes advantage of existing mechanisms regulating the award of employment visas that encourage proper utilisation of skills, while allowing for a greater emphasis on the quality of the applicant in the context of a points system. Secondly, a more flexible industry-level category can be created by:

“Identifying labor sectors that are experiencing worker shortages and designing point categories so that highly skilled immigrants that intend to work in those labor sectors are given more points” (Tabag, 2013, p. 301)

This approach is very similar to the approach of the Canadian government which uses easily adjustable quotas for individual professions, yet integrates this short-term sector-based objective within the immigration system as a whole. Thirdly, taking inspiration from some German proposals for reform (Duncan, 2012), bonus points can be awarded for degrees received in the US. This tackles the problem of return migration of US graduates and advantages those high-skill workers best suited for integration into the US labour market. The advantage of this system is that it is extremely flexible and the three categories can be easily rebalanced in response to market conditions. The US government should work with economists and businesses to construct these categories and regulate the allocation of points. The benefits of maintaining a stable of allocation of points for visa applicants should be balanced against market conditions. Evidence that Canada and Australia are moving their points systems of immigration to a greater inclusion of market forces (Koslowski, 2014) (Duncan, 2012) (Tabag, 2013) support the conclusion that this is a better system for international competition.

Another key aspect of this system is the ratio of points assigned to desirable skills, and points assigned to family links with the US. Currently the ratio of the quota of permanent immigration visas to employment based immigration visas is around 3:1; albeit the actual yearly allocation is closer to 5:4 (See table 1). Reform of the US immigration system should seek to rebalance this ratio in favour of employment based immigration. Although this paper will not suggest a specific ratio, ratios of 3:2 in favour of employment/skills based immigration are typical for Australia and Canada.

However, the hybrid-points system can only be implemented by US political actors and US industry will have a large influence on the outcome. Although US industries have lobbied against points systems in the past, a hybrid points system includes a strong role for major industry players to control which skills will be prioritised. At the same time, industries benefit from the current system as well, with the only vocal complaint being the visa caps. This will require top-down mobilisation of US industry by political actors to support reform as a pathway to a greater numbers of visas awarded.

US political actors however, have far more heterogeneous interests. Republicans are far more likely to support this reform, however the main contender for president is generally opposed to further opening of the US to immigration. In the future, larger percentages of ethnic minority groups as eligible voters may encourage a more permissive attitude to immigration reform that is less hostile to immigrants. However, at the same time this may move the debate from the traditional battle over family/employment visa allocation ratios to family/employment points allocation ratios. Education can certainly play a role in promoting high-skill immigration and the points system as a desirable outcome, however, immigration

politics have always been highly emotive. Considering this uncertainty over the feasibility of systemic change, it is necessary to examine which reforms can be made within the current system.

**Bargaining problems cannot be overcome: reforming the current demand-led visa system**

Policy prescriptions to improve the current system are relatively simple and well known. This paper attempted to show how, in the absence of proper reform to a hybrid demand-led points system, reform within the current system is necessary to both compete internationally and cope with current demand.

Higher quotas: This is clearly the easiest and most impactful area for reform. The exact level should be decided in co-operation with economists and businesses as far divorced from the political process as possible, but with an awareness of the vested interests of businesses. In Republican dominated congresses, an attempt should be made to transfer family-based visa quotas to the employment-based allocation. In Democrat dominated congresses, it is likely that only an absolute increase in visa quotas would be accepted.

Higher required qualifications for immigrants: Considering the current excess supply of potential high-skill migrants, the requirements for work experience should be increased and a percentage of employment visas should be reserved for those with higher qualifications; Master's level/professional qualifications and higher. This can be adjusted dynamically to the level of visa applications, however, with the projected growth in the global supply of high-skill labour this may be the long-term equilibrium level.

Simplified application process: There should be a better definition of categories, the UCSIS website should be updated, and the paperwork to be filled in by the potential immigrant should be simplified.

Labour market flexibility: The process for changing employers for temporary immigrants should be streamlined, both to better utilise skills and to prevent exploitation.

Improved regulation: The US government should increase the mandate of the Department of Labour to investigate and sanction exploitative employment practices. In particular, some of the larger consultancy firms who dominate the H-1B visa process should be investigated and regulators should make better use of whistleblowing to investigate abuse.

Improved pathways to a permanent visa: The US government should create more transparent and institutionalised ways for temporary high-skill residents to obtain a permanent visa. This can be targeted to the very high-skill and desirable such as STEM PhDs.

Anyone studying the US visa system would conclude that "the United States makes permanent residency a difficult and uncertain task" (Tabag, 2013, p. 283) and this is even more pertinent for non-permanent immigration. Reforms within the system should aim to

reduce frictions, uncertainties and barriers for potential migrants in ways that complement the needs of US businesses.

To conclude, the US visa system is complicated, opaque and often hostile for potential migrants. The US attracts far less high-skill immigrants, relative to its size, than major competitors, and without reform the US will be unable to properly support its high-tech industry. A systems analysis of future trends has shown that systemic change towards a hybrid demand-led points system would be beneficial. Nevertheless, in absence of sufficient political agreement, any measures which can mitigate the deficits of the current system and anticipate future trends in international migration will be beneficial. In addition, the propagation of US industry clusters and targeted high-skill immigration incentives will help the US compete for high-skill immigration in the probably medium-long term situation of high global demand.

## Appendix A – US Visa system

**Table 1: US visa system for high-skilled workers by temporary and permanent status (U.S. Department of State, 2015a) (U.S. Department of State, 2015b)**

	Description	Length (Years)	Cap?	Numerical Limits	Specific Requirements	2015 Yearly allocation
<b>Temporary Visas</b>						
L-1	Intracompany transfer	5-7	No		Specialist knowledge or executive position	78,537
O-1	Extraordinary ability	1-3	No			13,865
H-1B	Workers in a specialty occupations	3-6	Yes	65,000 + 20,000 for masters level education and higher	Industry sponsor Must be paid at least the prevailing wage	85,000
<b>Permanent Visas</b>						
Family	Immediate relatives		Yes	480,000	U.S. Sponsor	225,671
Employment Total	Desired skills + special categories and entrepreneurs		Yes	140,000		143,952

Employment 1	Priority workers		Yes	40,000	Immigrant petition from employer and job offer for academics/managers.	41,990
Employment 2	Members of professions holding advanced degrees/exceptional abilities		Yes	40,000	Job offer and immigrant petition from employer	44,479
Employment 3	Skilled workers with at least two years training, professionals with college degrees and non-seasonal unskilled labour		Yes	40,000	Immigrant petition from employer	35,421

## Appendix B – Visa system outcomes

**Table 2: High skilled visas issued by the US and ranked 2014/2015 (U.S. Department of State, 2015a) (U.S. Department of State, 2014)**

Country	Immigration employment preference visas issued (2015)	Rank	Number of H-1B visas issued (2014)	Rank	Number of L-1 visas (2014)	Rank
India	27,334	1	108,817	1	20,197	1
China (PRC)	21,889	2	14,871	2	4,500	4
Philippines	10,363	3	1,700	7	667	10
South Korea	9,926	4	2,727	4	1,908	9
Mexico	6,383	5	3,243	3	4,314	5
Canada	5,626	6	44	13	110	13
Great Britain	5,568	7	2,509	5	6,302	2
Brazil	2,721	8	1,352	9	2,654	7
Pakistan	2,313	9	670	12	161	12
Taiwan	2,225	10	1,505	10	441	11
France	2,151	11	1,709	6	2,714	6

Germany	1,773	12	1,213	11	2,481	8
Japan	1,954	13	1,369	8	4,893	3

**Table 3: The biggest US sponsors of H1B Visas and permanent employment based visas 2012-2015 (MyVisaJobs.com, 2016)**

Visa Rank	Employer	H1B Visa (2012-2015) (Denied, Withdrawn/Total)	Green Card (2012-2015) (Denied, Withdrawn/Total)
1	Infosys Limited	175/89480	186/1196
2	Tata Consultancy Services Limited	306/39450	1/5
3	IBM Corporation	3285/27398	108/651
4	Wipro Limited	349/27300	155/192
5	Deloitte Consulting Llp	340/20749	13/807
6	Accenture Llp	107/20215	6/93
7	Microsoft Corporation	233/12236	275/4402
8	Cognizant Technology Solutions U.S. Corporation	373/7584	306/7640
9	Hcl America, Inc.	70/13874	58/679
10	Larsen & Toubro Infotech Limited	423/12266	22/166
11	Google Inc.	306/9280	111/2768

## Appendix C

**Table 4: Tata & Infosys Pay Comparison FY13 (Hira, 2015b)**

FY13 H-1B Rank	Firm	New H-1Bs	Firm's Average Wage	Savings between American & H-1	Wage Savings
1	Infosys	6269	\$70882	\$39584	43%
2	Tata	6163	\$65466	\$44901	49%
SCE Worker Base Pay			110,466		



## References

- ANDERSON, S., 2016. Immigrants and Billion Dollar Startups, Arlington: National Foundation for American Policy.
- ASSOCIATED PRESS, 2006. LA Times. [Online] Available at: <http://articles.latimes.com/2006/feb/15/business/fi-taxsuit15> [Accessed 10 April 2016].
- AUSTRALIAN GOVERNMENT, 2014a. Australia's Migration Trends 2013–14 at a glance, s.l.: Department of immigration and Border Protection.
- AUSTRALIAN GOVERNMENT, 2014b. 2013–14 Migration Programme Report, s.l.: Department of Immigration and Border Protection.
- BLOOMBERG, 2013. Infosys Settles With U.S. in Visa Fraud Probe. [Online] Available at: <http://www.bloomberg.com/news/articles/2013-10-30/infosys-settles-with-u-s-in-visa-fraud-probe> [Accessed 24 April 2016].
- BORJAS, G., 2014. Immigration Economics. London: Harvard University Press.
- BUSINESS INSIDER, 2015. British tech workers get paid a lot less than Americans for doing the exact same job. [Online] Available at: <http://uk.businessinsider.com/british-tech-workers-paid-less-than-americans-hired-salary-data-015-7> [Accessed 25 04 2016].
- CARNEVALE, A., SMITH, N. & STROHL, J., 2013. Recovery: Job Growth and Education Requirements Through 2020, Washington D.C.: Georgetown Public Policy Institute.
- CLINTON, H., 2016. America needs comprehensive immigration reform with a pathway to citizenship.. [Online] Available at: <https://www.hillaryclinton.com/issues/immigration-reform/> [Accessed 21 04 16].
- DICE, 2016. 2015-2016 Dice Salary Survey. [Online] Available at: <http://media.dice.com/report/2015-2016-dice-salary-survey/> [Accessed 25 04 2016].
- DUNCAN, N., 2012. Immigration Policymaking in the Global Era. New York: Palgrave Macmillan.
- FACCHINI, G., MAYDA, A. & MISHRA, P., 2011. Do interest groups affect US immigration policy?. Journal of International Economics, Volume 85, pp. 114-128.
- FACCHINI, G. & STEINHARDT, M., 2011. Immigration policy with partisan parties. Journal of Public Economics, Volume 95, pp. 734-743.
- GOVERNMENT OF CANADA, 2013. Work permit holders for work purposes with permit(s) by sign year. [Online] Available at: <http://www.cic.gc.ca/english/resources/statistics/facts2013/temporary/3-1.asp> [Accessed 16 05 2016].
- GOVERNMENT OF CANADA, 2014a. Canada – Permanent residents by category. [Online] Available at: <http://www.cic.gc.ca/english/resources/statistics/facts2014/permanent/02.asp> [Accessed 13 05 2016].
- GOVERNMENT OF CANADA, 2014b. Facts & Figures 2014: Immigration Overview - Temporary Residents, s.l.: Open Canada.

- HAN, X., STOCKING, G., GEBBIE, M. & APPELBAUM, R., 2015. Will They Stay or Will They Go? International Graduate Students and Their Decisions to Stay or Leave the U.S. upon Graduation. *PLoS One*, 10(3).
- HIRA, R., 2015A. Congressional Testimony: Immigration Reforms Needed to Protect Skilled American Workers [Online] Economic Policy Institute. Available at: <http://www.epi.org/publication/congressional-immigration-reforms-needed-to-protect-skilled-american-workers/> [Accessed 30 June 2016]
- INFOSYS. 2016. Infosys Annual Report 2015-16, Bengaluru: Infosys.
- KERR, S., KERR, W. & LINCOLN, W., 2013. Skilled Immigration and the Employment Structures of U.S. Firms - Working Paper, Massachusetts: Harvard Business School.
- KERR, W., 2014. U.S. High-Skilled Immigration, Innovation and Entrepreneurship: Empirical Approaches and Evidence, Geneva: World Intellectual Property Organization.
- KOSLOWSKI, R., 2014. Selective Migration Policy Models and Changing Realities of Implementation. *International Migration*, 52(3), pp. 26-39.
- KOVEN, S. & GOTZKE, F., 2010. American Immigration Policy: Confronting the Nation's Challenges. New York: Springer.
- LLAVADOR, H. & SOLANO-GARCÍA, A., 2011. Immigration policy with partisan parties. *Journal of Public Economics*, Volume 95, pp. 134-142.
- MIGRATION POLICY, 2016. College-Educated Immigrants in the United States. [Online] Available at: <http://www.migrationpolicy.org/article/college-educated-immigrants-united-states#Employment and Occupation> [Accessed 29 06 16].
- MIPEX, 2015. Key findings. [Online] Available at: <http://www.mipex.eu/key-findings> [Accessed 12 05 2016].
- MYVISAJOBS.COM, 2016. Search Employer Database. [Online] Available at: [http://www.myvisajobs.com/Search\\_Visa\\_Sponsor.aspx](http://www.myvisajobs.com/Search_Visa_Sponsor.aspx) [Accessed 25 04 2016].
- NEW YORK TIMES, 2015. How Outsourcing Companies Are Gaming the Visa System. [Online] Available at: [http://www.nytimes.com/interactive/2015/11/06/us/outsourcing-companies-dominate-h1b-visas.html?\\_r=0](http://www.nytimes.com/interactive/2015/11/06/us/outsourcing-companies-dominate-h1b-visas.html?_r=0) [Accessed 25 04 2016].
- NORTH, D., 2011. Centre for Immigration studies. [Online] Available at: <http://cis.org/estimating-h1b-population-2-11> [Accessed 20 April 2016].
- OECD, 2015. What are the Earnings Advantages from Education?. [Online] Available at: [http://www.oecd-ilibrary.org/education/education-at-a-glance-2015/indicator-a6-what-are-the-earnings-advantages-from-education\\_eag-2015-12-en;jsessionid=90t4bj1sqjn2r.x-oecd-live-02](http://www.oecd-ilibrary.org/education/education-at-a-glance-2015/indicator-a6-what-are-the-earnings-advantages-from-education_eag-2015-12-en;jsessionid=90t4bj1sqjn2r.x-oecd-live-02) [Accessed 12 07 2016].
- OECD, 2016. Average annual wages. [Online] Available at: [https://stats.oecd.org/Index.aspx?DataSetCode=AV\\_AN\\_WAGE#](https://stats.oecd.org/Index.aspx?DataSetCode=AV_AN_WAGE#) [Accessed 12 07 2016].

- ORRENIUS, P. & ZAVODNY, M., 2014. A Comparison of the U.S. and Canadian Immigration Systems. Washington DC, Global High-Skilled Immigration Workshop.
- PARSONS, C., 2015. What's the best policy to attract high-skilled migrants?. [Online] Available at: <https://www.weforum.org/agenda/2015/06/whats-the-best-policy-to-attract-high-skilled-migrants/> [Accessed 12 05 2016].
- PEW RESEARCH, 2013. Americans Divided over Immigration Reform. [Online] Available at: <http://www.pewglobal.org/2013/04/03/americans-divided-over-immigration-reform/> [Accessed 21 04 16].
- PWC, 2013. Global wage projections to 2030, London: PricewaterhouseCoopers.
- SCHIADA, A., 2013. Criteria for Selecting a High-Tech Cluster. [Online] Available at: <http://www.areadevelopment.com/HighTechNanoElectronics/Q4-2013/site-selection-criteria-high-tech-companies-26282561.shtml> [Accessed 25 04 2016].
- Slaper, T. & Ortuzar, G., 2015. Industry Clusters and Economic Development. Indiana Business Review, 90(Spring), pp. 7-9.
- SOMERVILLE, K. & WALSWORTH, S., 2009. Vulnerabilities of Highly Skilled Immigrants in Canada and the United States. American Review of Canadian Studies, 39(2), pp. 147-161.
- TABAG, C., 2013. The Point of a Points System: Attracting Highly Skilled Immigrants the United States Needs and Ensuring Their Success. VANDERBILT JOURNAL OF TRANSNATIONAL LAW, Volume 46, pp. 271-302.
- THISSEN, W., 2013. Diagnosing Policy Problem Situations. In: Public Policy Analysis: New Developments. New York: Springer, pp. 65-102.
- THOPPIL, D. A., 2014. Wall Street Journal. [Online] Available at: <http://www.wsj.com/articles/infosys-whistleblower-files-another-lawsuit-1412324348> [Accessed 16 April 2016].
- TRUMP, D., 2016. IMMIGRATION REFORM THAT WILL MAKE AMERICA GREAT AGAIN. [Online] Available at: <https://www.donaldjtrump.com/positions/immigration-reform> [Accessed 21 04 16].
- U.S. Department of State, 2014. FY 2014 Nonimmigrant Visas Issued. s.l.:s.n.
- U.S. Department of State, 2015a. Table V (Part 1): Immigrant Visas Issued and Adjustments of Status Subject to Numerical Limitations - Fiscal Year 2015. s.l.:s.n.
- U.S. Department of State, 2015b. Table XVI(B): Nonimmigrant Visas Issued by Classification (Including Border Crossing Cards) - Fiscal Years 2011-2015. s.l.:s.n.
- UNESCO, 2016. Gross enrolment ratio by level of education. [Online] Available at: <http://data.uis.unesco.org/?queryid=142> [Accessed 12 05 2016].
- US BUREAU OF ECONOMIC ANALYSIS, 2016. Gross-Domestic-Product-(GDP)-by-Industry Data. [Online] Available at: [http://www.bea.gov/industry/gdpbyind\\_data.htm](http://www.bea.gov/industry/gdpbyind_data.htm) [Accessed 29 06 2016].

- USCIS, 2016b. Permanent Workers. [Online] Available at: <https://www.uscis.gov/working-united-states/permanent-workers> [Accessed 18 04 16].
- WADHWA, V., SAXENIAN, A., FREEMAN, R. & GEREFFI, G., 2009. America's Loss is the World's Gain: America's New Immigrant Entrepreneurs, Part IV, s.l.: SSRN.
- WALKER, W. & VAN DAALEN, E., 2013. System Models for Policy Analysis. In: Public Policy Analysis: New Developments. New York: Springer, pp. 157-184.
- WALL STREET JOURNAL (WSJ). 2013. U.S. Probes Companies in Wake of Infosys Case. [Online] Available at: <http://www.wsj.com/articles/SB10001424052702303843104579170202910758892> [Accessed 30 June 2016]
- WOLF, M. & TERRELL, D., 2016. The high-tech industry, what is it and why it matters to our economic future, Washington D.C.: U.S. BUREAU OF LABOR STATISTICS.
- YOUNG-BAE, K., LEVINE, P. & LOTTI, E., 2010. Migration, skill composition and growth. national institute economic review, Volume 213, pp. 5-20.