

Calgary Economic Development

Physical Science

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1. OBJECTIVE

1.1 Purpose of the Study

With the completion of the occupational demand forecast, Calgary Economic Development (CED) now has insight as to those occupations that will be in high demand or will experience high growth over the next ten years. This information will be extremely useful to the community, assisting with workforce planning, development of curriculum and rationalizing specific industry or occupational support through workforce development activities.

It is widely acknowledged that at some point in the near future, the large majority of Canada's employment growth will come from immigration. CED proposes to undertake a study that will enable Calgary to be at the forefront of the immigration stream, and be actively marketing and recruiting in markets that have a demonstrated supply of talent that is aligned with occupations in high demand or high growth over the next ten years. The purpose of the project is to support CED's workforce recruitment efforts with informed, sound and rigorous analysis of global talent supply. The analysis enables CED and others to be strategic in regards to the geographies in which recruiters may undertake in-market recruiting and visitation. Given the high costs of such activities, CED wishes to inform and substantiate its activities to ensure the highest chances of success and the greatest return on its investment. Additionally, the information regarding talent supply modeling can be disseminated to Calgary employers in order to support their planning for overseas recruiting efforts.

The objective of this study is to provide guidance on which countries should be targeted for attraction of "supply" worker talent to meet Calgary's labour demand. The analysis is informed by statistics collected from 106 countries on the number of workers employed in each country in a number of "target occupations" which are in high demand in Calgary. The study also presents statistics which inform the probability of success in recruiting from each country. These measures can be used to further inform due diligence when evaluating the prospects of recruiting workers from any of the 106 countries. These measures are used to construct two indices which rank countries according to the probability of success in recruiting from each country.

1.2 Selection of Target Occupations

The selection of target occupations was based on the Calgary Labour Market Demand Study completed by Calgary Economic Development in January, 2008. This study highlighted the future demand for workers in Calgary for over 400 occupations. The Calgary Labour Market Demand Study identified, for each occupation, the number of workers which the Calgary Economic Region will require and could employ over a ten-year forecast horizon.

Together, RDA Global and CED identified thirty (30) occupational groups to target for recruitment. The groups were first of all based on the occupations which will be in high demand as identified in the Calgary Labour Market Demand Study. Consideration was given to the overall benefit of international recruiting efforts vis-à-vis the high-demand occupations--it was determined that *skilled workers* were the top priority for international recruiting. This resulted in some occupations, such as retail salespersons, not being included in the target occupations, despite the fact that these workers are in high demand.

The selection of groups of target occupations was based on broad functional categories which often aggregated workers at different skill levels in a particular field. For instance, computer science professionals and computer science technicians were grouped together into a category. This approach was taken because sometimes the only difference between two occupations is the number of years of education of the worker and functionally the jobs are quite similar. The grouping approach provided an advantage of broadly identifying the source of labour supply for larger groups which characterized types of workers. The thirty groups identified cover about 1/3 of the existing jobs in Calgary.

The specific selection of each target occupation group was made on the basis of four criteria:

- (1) Preference was given to occupations in which there are a large number of workers in demand in the future (i.e. accountants and financial professionals).
- (2) Preference was given to occupations in which demand is growing at a fast rate in the next five years (i.e. petroleum engineers).
- (3) Preference was given to occupation for which demand is growing at a fast rate in the next ten years (i.e. nurses)
- (4) Preference was given to workers with higher skill levels as these are workers which firms are more likely to invest in heavily to insure that they have adequate labour supply.

Table 1.1 Target Occupations Selected for Study of International Labour Supply

Occupation Group Number	Occupations	Workers in 2007	Demand for Workers in 2017	Growth 2007-17	Workers Required for New Jobs
1	C01 Physical science professionals &	7,740	11,169	44%	3,429
	C11 Technical occupations in physical sciences	5,044	7,325	45%	2,282
2	C03 Civil, mechanical, electrical and chemical engineers &	10,965	16,319	49%	5,354
	C13 Technical occupations in civil, mechanical and industrial engineering	3,364	5,046	50%	1,682
3	C04 Other engineers &	12,073	17,527	45%	5,453
	C14 Technical occupations in electronics and electrical engineering	5,784	8,542	48%	2,758
4	C05 Architects, urban planners and land surveyors &	3,037	4,542	50%	1,504
	C15 Technical occupations in architecture, drafting, surveying and mapping	5,461	8,155	49%	2,694
5	C07 Computer and information systems professionals &	19,663	29,248	49%	9,585
	C18 Technical occupations in computer and information systems	7,786	11,483	47%	3,697
6	D01 Physicians, dentists and veterinarians	4,612	7,208	56%	2,596
7	D02 Optometrists, chiropractors and other health diagnosing and treating professionals	756	1,183	56%	427
8	D03 Pharmacists, dietitians and nutritionists	1,515	2,314	53%	799
9	D04 Therapy and assessment professionals	1,987	3,089	55%	1,102
10	D11 Nurse supervisors and registered nurses	9,017	14,046	56%	5,029
11	D21 Medical technologists and technicians (except dental health)	5,783	8,936	55%	3,154
12	D22 Technical occupations in dental health care	1,677	2,578	54%	901
13	D23 Other technical occupations in health care (except dental)	4,231	6,550	55%	2,318
14	D31 Assisting occupations in support of health services	8,429	13,175	56%	4,746
15	E13 Secondary and elementary school teachers and educational counsellors	21,418	26,906	26%	5,488
16	J12 Machine operators and related workers in metal and mineral products processing	1,346	1,957	45%	611
17	B01 Auditors, accountants and investment professionals	30,151	36,516	21%	6,365
18	B53 Finance and insurance clerks	18,608	22,491	21%	3,883
19	H11 Plumbers, pipefitters and gas fitters	4,702	6,135	30%	1,433
20	H12 Carpenters and cabinetmakers	8,297	10,812	30%	2,515
21	H13 Masonry and plastering trades	4,102	5,418	32%	1,316
22	H14 Other construction trades	6,459	8,529	32%	2,070
23	H21 Electrical trades and telecommunications occupations	9,423	12,298	31%	2,875
24	H31 Machinists and related occupations	1,437	1,816	26%	379
25	H32 Metal forming, shaping and erecting trades	6,952	8,915	28%	1,963
26	H41 Machinery and transportation equipment mechanics (except motor vehicle)	6,881	8,853	29%	1,972
27	H42 Automotive service technicians	5,861	7,550	29%	1,689
28	H43 Other mechanics	1,037	1,344	30%	307
29	H51 Upholsterers, tailors, shoe repairers, jewellers and related occupations	1,437	1,822	27%	385
30	H52 Printing press operators, commercial divers and other trades and related occupations, n.e.c.	1,236	1,549	25%	313

2. IMMIGRATION INDICES & LABOUR SUPPLY

2.1 Immigration Supply/Demand Index

To analyze the likelihood of workers in a target country would immigrate to Calgary, we developed an index which we refer to as the Immigration Supply/Demand Index. This index captures raw labour availability from each country and is based partially on the total stock of emigrates from the country and actual immigration to Calgary during the latest Census cycle. Countries which have a high rate of outward emigration or high rate of immigration to Calgary received high scores. Countries with both features naturally received the highest scores while those with neither received relatively low scores. The immigration supply/demand index captures an important dimension of labour mobility, but is not specific to a particular occupation.

2.2 Qualities of Immigrating Population Index

A second important consideration in selecting countries to target for recruiting is the relative difficulty that workers will face in integrating into Canadian life and culture. The second index captures the quality of the emigrating population informs us more about the qualities of persons from these countries that might make communication (perhaps assimilation) easier and provide for greater infusion of workers into Calgary's labour market. Those countries with populations which have greater skills (e.g. education and English language proficiency) will have a greater rank than those with emigrating populations who do not.

2.3 Analysis of Labour Supply

Building on the two indices (the supply/demand index and the qualities of the immigrating population index) we have provided a standard analysis for each of the target occupational groups. The analysis is based on the following:

- (1) Based on the natural breaks in the immigration supply/demand index, countries which received low immigration scores were removed from the list of potential country targets. This essentially filtered out countries which have low levels of emigration or historically have not had much or any immigration to Calgary.
- (2) The remaining countries were plotted on a two way axis which is used for strategic assessment. On the y-axis is the country's score for the immigration supply/demand index and on the x-axis is the country's score for the qualities of the immigrating population. This sorted the remaining countries into one of four quadrants—
 - a. High immigrant labour availability which is relatively easy to recruit (the upper right quadrant)
 - b. High immigrant labour availability which is relatively difficult to recruit (the upper left quadrant)
 - c. Smaller immigrant labour demand availability which is relatively easy to recruit (the lower right quadrant) and

- d. Smaller immigrant labour demand availability which is also relatively more difficult to recruit.

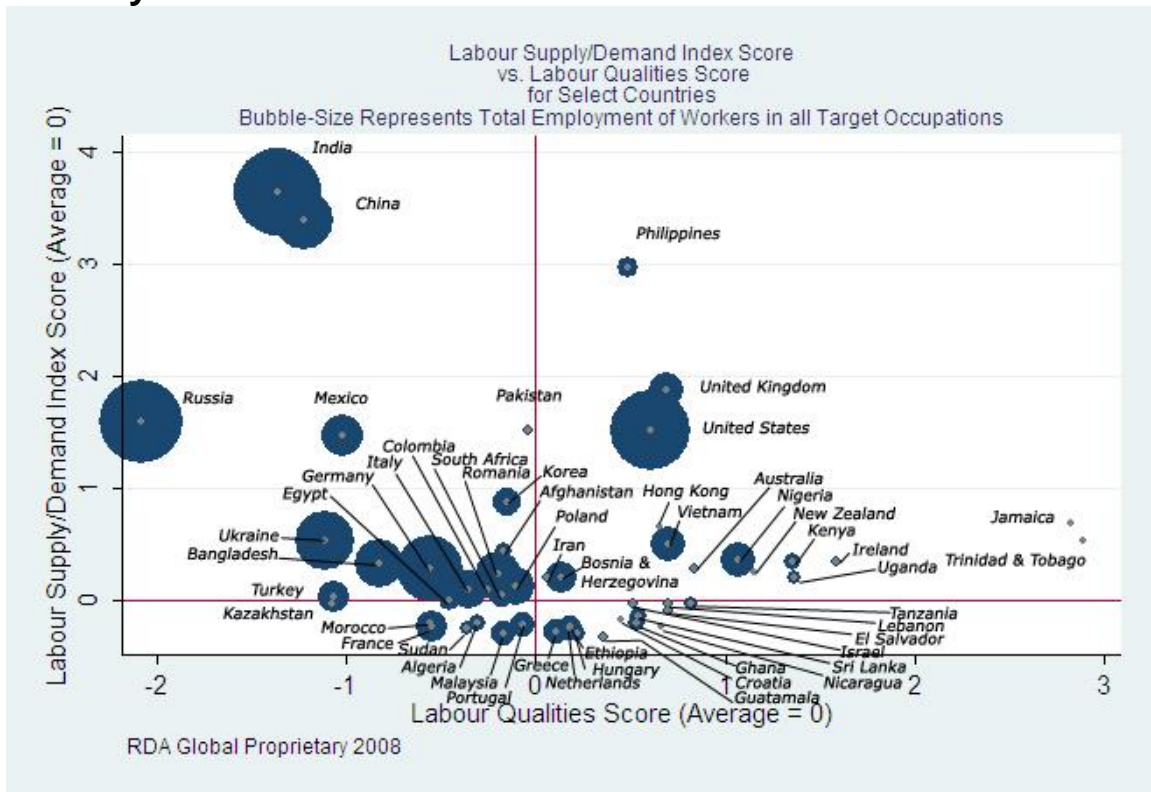
In terms of assessment, the countries falling in quadrant (a) (the top right quadrant) can be considered “low-hanging fruit.” Recruitment efforts from these countries are likely to be successful. Countries falling in quadrant (b) (top left) are the next most likely to be successful. Workers from these countries have high levels of mobility, however, due to language, education or cultural factors, integration into the Calgary workforce will be more difficult. It should be noted that workers from the countries falling into this quadrant have historically had relatively high levels of immigration to Calgary or Canada, despite these difficulties. Workers from quadrant (c) (lower right) are a third tier choice for recruiting, however, these niche countries may provide good key sources of supply, especially if special training relationships can be established. Workers from these countries are likely to easily integrate into the Calgary workforce, and the source countries should be seen as a potential target for mid-term and long-term immigration partnership. Countries falling into quadrant (d) (lower left) reflect a smaller mobile workforce and will also face difficulties in integrating into Canadian life and work.

It should be noted that all countries appearing in the four-quadrant graphs have historically shown some level of immigration to Canada and thus the segmentation of workers according to the four quadrants should be seen as relative differences and workers from countries in all four quadrants can be considered as potential recruitment targets.

- (3) The final measure introduced into the strategic assessment figure is the number of workers in the target occupational group in each country. This measure is represented by the size of the bubble (or dot) that represents each country. A country with a large bubble has a large amount of supply. A country with a small bubble has a small level of supply. The bubble size is specific to the occupational group being assessed.

Interpretation of the strategic assessment figures is best completed by identifying the larger bubbles and their location within the four quadrants. These represent the key large supply opportunities. Smaller bubbles represent locations with smaller supply however they may represent areas of high recruiting success based on the quadrant in which they fall.

Figure 1.1 Total Targeted Labour Supplies from Each Target Country



3. GENERAL RECOMMENDATIONS

Figure 1.1 provides an analysis of labour supply that can be targeted for recruitment of the target occupations. The bubble size represents the total number of workers in each country who are working in one of the target occupations noted in table 1.1. Specific strategies for attracting workers internationally can be further informed by the analysis of supply for the particular occupational group (the figure above covers all target occupational groups combined); however, generally speaking, the larger countries in the upper quadrants represent the best supply. Those in the upper left quadrant also offer good labour supply, however, these workers will face greater difficulties in integrating into Canadian life. CED and others involved in recruiting must consider these difficulties when recruiting workers from these countries and if recruiting is undertaken in these countries, additional efforts and costs will likely be required to bridge the cultural and language difficulties that workers from these countries will face when integrating into Calgary's workforce. The remaining two quadrants present certain difficulties. Those in the bottom right quadrant are less likely to encounter difficulty integrating into Calgary's workforce however they are also less likely to actually immigrate, and generally represent smaller pockets of supply. A highly-targeted recruitment strategy for these countries is required which takes into consideration "push factors" which might motivate particular workers in these countries to seek work opportunities overseas. Those in the bottom left quadrant generally represent less attractive prospects, however, for certain occupations they may prove helpful. Further analysis of a specific occupation may highlight a large pool of workers falling in this quadrant. If recruiting prospects in more attractive countries is not adequate to meet demand, the sheer size of the supply in this quadrant may justify the costs recruiting from the country. However, it should be understood that special efforts must be made to overcome difficulties these workers will face in transitioning to work in Calgary. Incentives may have to be high to persuade these workers to immigrate as workers from these countries have traditionally been less likely to immigrate to Canada.

We recommend coordinating recruiting efforts in the 23 countries in Table 1.2 which represent the largest total supply of all target workers with relatively high probability of recruiting success. These top 23 countries represent a combined 63% of the total global workforce working in the target occupations. The list of countries also reflects countries which had relatively higher scores on the immigration demand/supply index.

Some countries in the list do not match our intuition on the overall opportunity in recruiting. In particular, Bangladesh, Nigeria, and Vietnam are poorer countries which were added to the list of top prospects because of the size and composition of their labour force. In addition, Canada is the second largest destination country for Vietnamese emigrates. Nigeria's use of English language made it relatively more attractive and Bangladesh's stock of emigrates is similar to that of the UK—over four million emigrates—and Canada is in the top ten destination countries for these immigrants.

Recruiting efforts in these three countries can be considered somewhat speculative and additional research may be needed to confirm the feasibility of recruiting certain types of workers from these countries.

The countries in Table 1.2 represent either large sources of supply or supply which is very likely to immigrate to Calgary and integrate well into the Calgary workforce.

Table 1.2 Top Countries for Labour Supply of Target Occupations

Rank	COUNTRY	Worker Supply in Target Occupations (2007)	Total Employees (2007)	Percent of Employees Working in Target Occupations
1	China	71,880,818	653,035,937	11%
2	India	46,094,388	361,737,670	13%
3	United States	37,882,263	141,094,529	27%
4	Russia	20,410,043	70,933,485	29%
5	Bangladesh	14,979,967	69,090,401	22%
6	Germany	14,443,131	41,957,052	34%
7	Nigeria	9,313,256	41,914,644	22%
8	Mexico	8,492,912	37,684,557	23%
9	United Kingdom	7,788,278	27,830,597	28%
10	France	7,649,080	25,322,084	30%
11	Italy	6,645,482	23,524,656	28%
12	Vietnam	6,537,721	42,672,984	15%
13	Ukraine	5,549,141	20,996,651	26%
14	Poland	4,875,280	16,253,997	30%
15	Turkey	4,785,719	22,418,049	21%
16	Philippines	4,552,528	33,297,165	14%
17	Korea	4,228,549	21,532,279	20%
18	Australia	3,453,583	10,591,815	33%
19	Hong Kong	726,194	3,330,118	22%
20	New Zealand	633,883	2,125,627	30%
21	Ireland	576,727	2,074,922	28%
22	Jamaica	312,534	1,094,334	29%
23	Trinidad & Tobago	142,987	551,984	26%

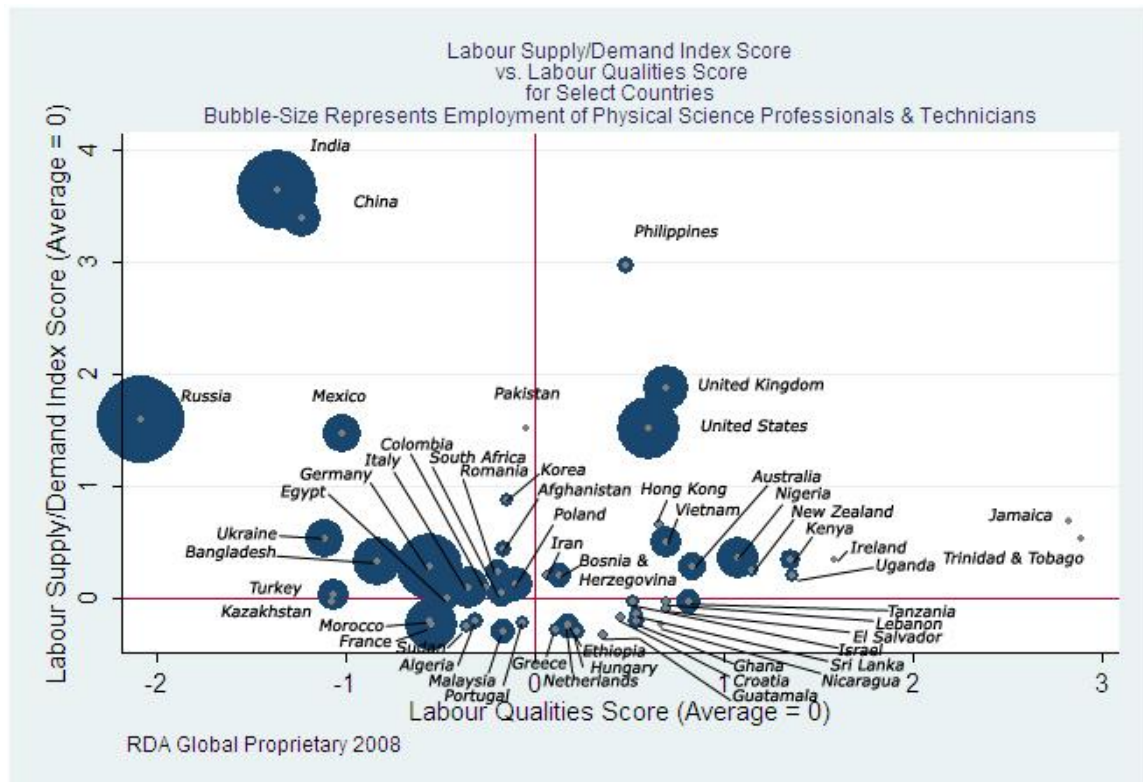
4. TARGET RECOMMENDATIONS

4.1 Physical Science Professionals & Technicians

This occupational group contains the following worker occupations:

- Chemical Technologists and Technicians
- Chemists
- Geological and Mineral Technologists and Technicians
- Geologists, Geochemists and Geophysicists
- Meteorological Technicians
- Meteorologists
- Other Professional Occupations in Physical Sciences
- Physicists and Astronomers

Figure 4.1 Strategic Assessment of Labour Supply for Physical Science Professionals and Technicians



India, Russia, and Germany are the top countries employing these workers. Workers from the US, UK, Nigeria, Australia, and Vietnam are countries that have traditionally had less difficulty in transitioning into Canadian life. Japan, France, Italy, Ukraine, Brazil, and China all represent additional large sources, however, it is less likely that recruiting will be successful from these countries due to cultural and language differences as well as

relatively attractive opportunities to find work within these countries without a need to emigrate.

Table 4.1 Total Physical Science Professionals and Technicians Employed in Each country

Rank	Country	Workers in Occupation (2007)	Rank	Country	Workers in Occupation (2007)
1	Russia	435,955	54	Bolivia	14,076
2	India	388,274	55	Netherlands	13,688
3	Japan	290,305	56	Singapore	13,448
4	Germany	267,006	57	Israel	13,316
5	United States	231,107	58	Portugal	13,114
6	Brazil	219,185	59	Kazakhstan	12,686
7	France	158,761	60	Morocco	12,199
8	Bangladesh	141,392	61	Peru	11,787
9	Indonesia	132,463	62	Denmark	11,166
10	United Kingdom	122,639	63	Sudan	10,672
11	Italy	101,675	64	Sri Lanka	10,608
12	Nigeria	96,320	65	Slovakia	10,251
13	China	89,321	66	Norway	9,971
14	Ukraine	80,509	67	New Zealand	9,599
15	Mexico	79,535	68	Korea	9,502
16	Poland	74,770	69	Slovenia	9,442
17	Canada	68,695	70	Greece	9,191
18	Turkey	55,187	71	Honduras	8,585
19	Vietnam	54,893	72	Hong Kong	8,575
20	Taiwan	46,098	73	El Salvador	8,123
21	South Africa	42,528	74	Jordan	7,985
22	Australia	42,480	75	Thailand	7,787
23	Malaysia	37,566	76	Costa Rica	7,551
24	Venezuela	37,106	77	Kuwait	7,516
25	Romania	36,614	78	Puerto Rico	7,410
26	Egypt	33,766	79	Lebanon	7,270
27	Belgium	33,710	80	Ecuador	7,157
28	Ethiopia	32,995	81	Bosnia and Herzegovina	7,035
29	Iran	32,595	82	Cambodia	6,733
30	Saudi Arabia	32,504	83	Dominican Rep.	6,369
31	Tanzania	31,692	84	Croatia	6,123
32	Spain	31,012	85	Guatemala	5,993
33	Kenya	29,838	86	Paraguay	5,855
34	Sweden	29,668	87	Tunisia	4,478
35	Nepal	29,289	88	Colombia	4,364
36	Argentina	27,496	89	Ireland	4,067
37	Czech Republic	23,395	90	Pakistan	3,916
38	Uzbekistan	22,384	91	Panama	3,313
39	Chile	21,997	92	Albania	3,304
40	Belarus	21,882	93	Macedonia	3,193
41	Austria	19,247	94	Trinidad & Tobago	2,854
42	Afghanistan	19,227	95	Jamaica	2,760
43	Switzerland	18,790	96	Uruguay	2,440
44	Hungary	18,277	97	Nicaragua	2,279
45	Philippines	17,674	98	Lithuania	2,013
46	Ghana	16,919	99	Bahrain	1,825
47	Mozambique	16,358	100	Latvia	1,745
48	UAE	16,135	101	Brunei	1,134
49	Algeria	15,929	102	Cyprus	1,011
50	Finland	15,375	103	Macau	888
51	Bulgaria	15,163	104	Luxembourg	608
52	Syria	14,977	105	Bermuda	191
53	Uganda	14,495			

4.2 Measures Informing Indexes

Several measures were tested in a factor analysis to determine the best indicators of likelihood of success in attracting workers from each country. The following five measures loaded well on the factor analysis and were eventually used in the immigration indices.

EMSTOCK: a measure of emigration stock which denotes the number of emigrants from each country—in total number of persons—in 2005.

CALIMM: a measure of the total number of persons who immigrated to Calgary from 1996-2001.

ENGLISH: a measure which attempts to account for the requisite English language requirements for immigration to Canada. Each country was coded based on the formal and informal usage of English as a language. For example, Australia and New Zealand were coded as 1; Argentina and France coded as 0; and India and Pakistan were coded as 0.5 because of the informal importance (e.g. social and political mobility) of English despite the fact that these countries have other state languages.

EMRATE_TERED: a measure that attempts to tap into the skill level of emigrants. This variable is the emigration rate of the tertiary educated population in each country for the year 2000. The variable is quantified in percentages of people in each country with a tertiary education who have emigrated from the country.

CANRANK05: Each country in the dataset has a list of top ten countries for emigration. The countries that had Canada in the top ten were ranked according to their order within the top ten (e.g. Canada was the second ranked place for immigrants from Mexico so it received a value of 2). Additionally, those countries in which Canada was not in the top ten for 2005 were coded 11.

Table 1.3 Measures Informing the Immigration Indices

Country	EMSTOCK Number of emigrants from each country—in total number of persons	CALIMM Number of persons who immigrated to Calgary from 1996-2001	ENGLISH Requisite English language requirements for immigration	EMRATE_TERED Emigration rate of the tertiary educated population (%)	CANRANK05 Countries that had Canada in the top ten destinations for emigrants are ranked according to their order within the top ten
Afghanistan	2,031,678	915	0	13.2	5
Albania	860,485	50	0	20	6
Algeria	1,783,476	125	0	6.5	6
Argentina	806,369	90	0	2.5	9
Australia	415,270	215	1	2.3	4
Austria	415,270	35	0	2.3	4
Bahrain	20,090	50	0	3.4	4
Bangladesh	4,885,704	295	0	4.7	7
Belarus	1,799,790	10	0	3	11
Belgium	454,599	-	0	5.9	7
Bermuda	24,281	-	1		3
Bolivia	417,956	25	0	6	7
Bosnia and Herzegovina	1,471,594	725	0	28.6	8
Brazil	1,135,060	105	0	3.3	11
Brunei	12,623	15	0	21	1
Bulgaria	937,341	105	0	5.8	10
Cambodia	348,710	85	0	6.8	5
Chile	584,869	60	0	5.3	5
China	7,258,333	4,065	0	4.2	4
Colombia	1,969,282	485	0	11	6
Costa Rica	127,061	15	0	6.6	6
Croatia	726,031	225	0	29.4	5
Cyprus	160,728	10	0	17.9	6
Czech Republic	418,175	30	0	9.9	5
Denmark	234,008	55	0	7	6
Dominican Rep.	1,068,919	-	0	21.7	11
Ecuador	1,016,037	10	0	10.9	5
Egypt	2,399,251	310	0	4.2	6
El Salvador	1,128,701	125	0	31.5	2
Ethiopia	445,926	230	0	17	5
Finland	333,155	10	0	8.4	4
France	1,889,164	155	0	3.9	8
Germany	4,095,015	330	0	8.8	6
Ghana	906,698	175	0	42.9	8
Greece	1,218,233	10	0	14	4
Guatemala	685,713	10	0	21.5	4
Honduras	414,955	-	0	21.8	7
Hong Kong	716,246	1,270	0	28.7	1
Hungary	471,298	115	0	12.1	3
India	9,987,129	3,595	0.5	4.2	8
Indonesia	1,736,717	20	0	2	10
Iran	969,920	735	0	13.1	3
Ireland	927,904	15	1	34.4	4
Israel	808,078	50	0.5	6.5	3
Italy	3,459,027	130	0	7	4
Jamaica	1,037,599	145	1	82.5	3
Japan	940,028	110	0	1.5	6
Jordan	641,154	55	0	6.4	6
Kazakhstan	3,710,351	185	0	1.1	11
Kenya	427,324	200	1	26.3	5
Korea	1,609,206	1,590	0	7.9	3
Kuwait	185,802	75	0	10	3

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Country	EMSTOCK Number of emigrants from each country—in total number of persons	CALIMM Number of persons who immigrated to Calgary from 1996- 2001	ENGLISH Requisite English language requirements for immigration	EMRATE TERED Emigration rate of the tertiary educated population (%)	CANRANK05 Countries that had Canada in the top ten destinatinos for emigrates are ranked according to their order within the top ten
Latvia	232,865	60	0	10.2	5
Lebanon	621,903	335	0	29.7	2
Lithuania	320,473	10	0	11.8	8
Luxembourg	42,361	-	0	7.6	11
Macau	-	-	0	-	-
Macedonia	370,826	10	0	20.9	11
Malaysia	1,458,944	30	0	10.4	6
Mexico	11,502,616	285	0	14.3	2
Morocco	2,718,665	15	0	10.3	9
Mozambique	803,261	-	0	42	11
Nepal	753,662	40	0	2.7	11
Netherlands	812,475	120	0	8.9	2
New Zealand	498,006	90	1	15	4
Nicaragua	683,520	45	0	30.9	3
Nigeria	836,832	310	1	36.1	11
Norway	180,575	50	0	5.4	7
Pakistan	3,415,952	1,780	0.5	9.2	5
Panama	215,240	10	0	20	4
Paraguay	421,279	-	0	2.3	4
Peru	898,829	110	0	6.3	8
Philippines	3,631,405	3,315	1	14.8	4
Poland	2,316,438	380	0	12.3	4
Portugal	1,950,486	-	0	13.8	5
Puerto Rico	-	-	-	-	-
Romania	1,244,052	850	0	14.1	7
Russia	11,480,137	890	0	1.3	11
Saudi Arabia	80,705	130	0	0.7	2
Singapore	230,007	110	0	15.2	10
Slovakia	520,962	95	0	15.3	6
Slovenia	133,965	-	0	11	4
South Africa	713,104	690	0	5.4	5
Spain	1,323,373	-	0	2.6	11
Sri Lanka	935,599	160	0	27.5	3
Sudan	587,120	400	0	5.6	8
Sweden	300,771	35	0	4.4	9
Switzerland	481,060	105	0	9.1	6
Syria	480,708	85	0	5.2	6
Taiwan	-	715	0	-	-
Tanzania	188,789	110	0.5	15.8	3
Thailand	758,180	45	0	2.2	11
Trinidad & Tobago	361,596	45	1	78.4	2
Tunisia	623,221	10	0	9.6	9
Turkey	4,402,914	125	0	4.6	11
UAE	41,287	110	0	1.2	3
Uganda	154,747	45	1	21.6	4
Ukraine	6,081,890	410	0	6	9
United Kingdom	4,158,909	1,600	1	16.7	3
United States	2,261,443	1,550	1	0.5	2
Uruguay	288,480	10	0	8.6	6
Uzbekistan	2,185,539	45	0	1	11
Venezuela	463,759	115	0	3.3	5
Vietnam	2,225,413	685	0	39	2
Vietnam	2,225,413	685	0.0	39.0%	2

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5. METHODOLOGY

5.1 Immigration Supply/Demand Index

The Immigration Supply Demand Index captures raw labour availability from each country and is based partially on the total stock of emigrates from the country and actual immigration to Calgary during the latest Census cycle. Countries which have a high rate of outward emigration or high rate of immigration to Calgary received high scores. Countries with both features naturally received the highest scores while those with neither received relatively low scores. The immigration supply/demand index captures an important dimension of labour mobility, but is not specific to a particular occupation. Additional background on the Immigration Supply/Demand Index is contained in the methodology section of this report.

The index scoring revealed natural groupings of countries with eleven (11) countries receiving notably high scores, and forty one (41) countries receiving mid-level scores. The remaining countries all received low scores and these scores were relatively similar to one another. Figure 1.2 contains the high-scoring countries. These countries typically displayed a large stock of labour supply for emigration and/or high levels of immigration into Calgary. Given the high level of mobility and/or established immigrant community in Calgary, workers from these countries are highly likely to immigrate to meet the labour demand in Calgary.

Figure 1.2 High Scoring Countries in the Demand/Supply Index

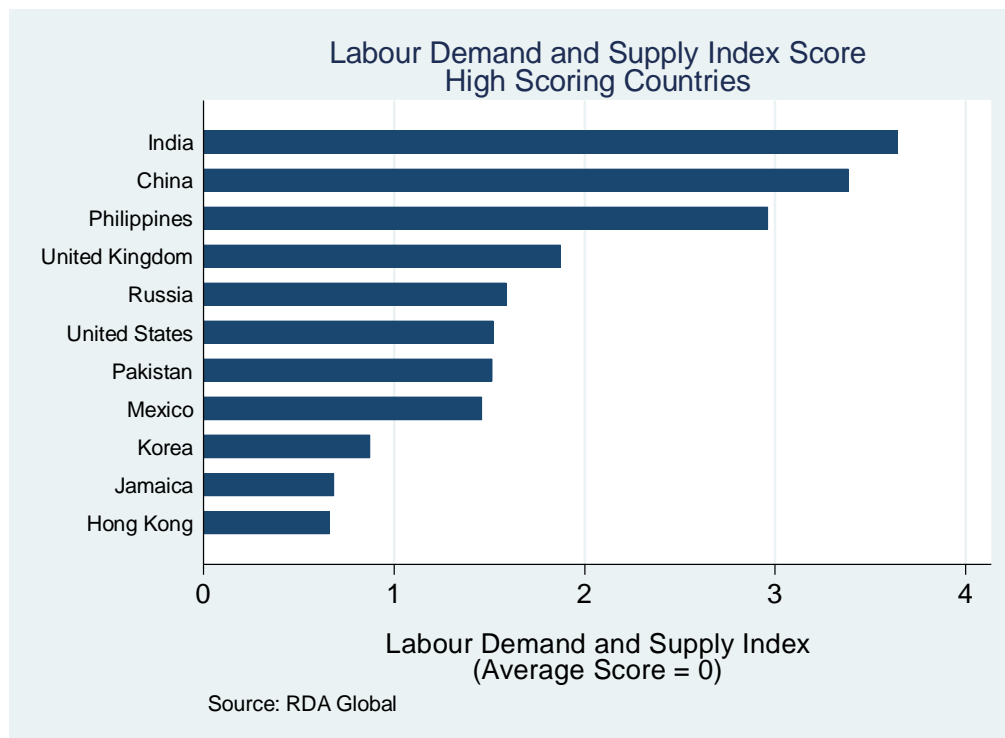


Figure 1.3 Labour Demand and Supply Index (All Countries)

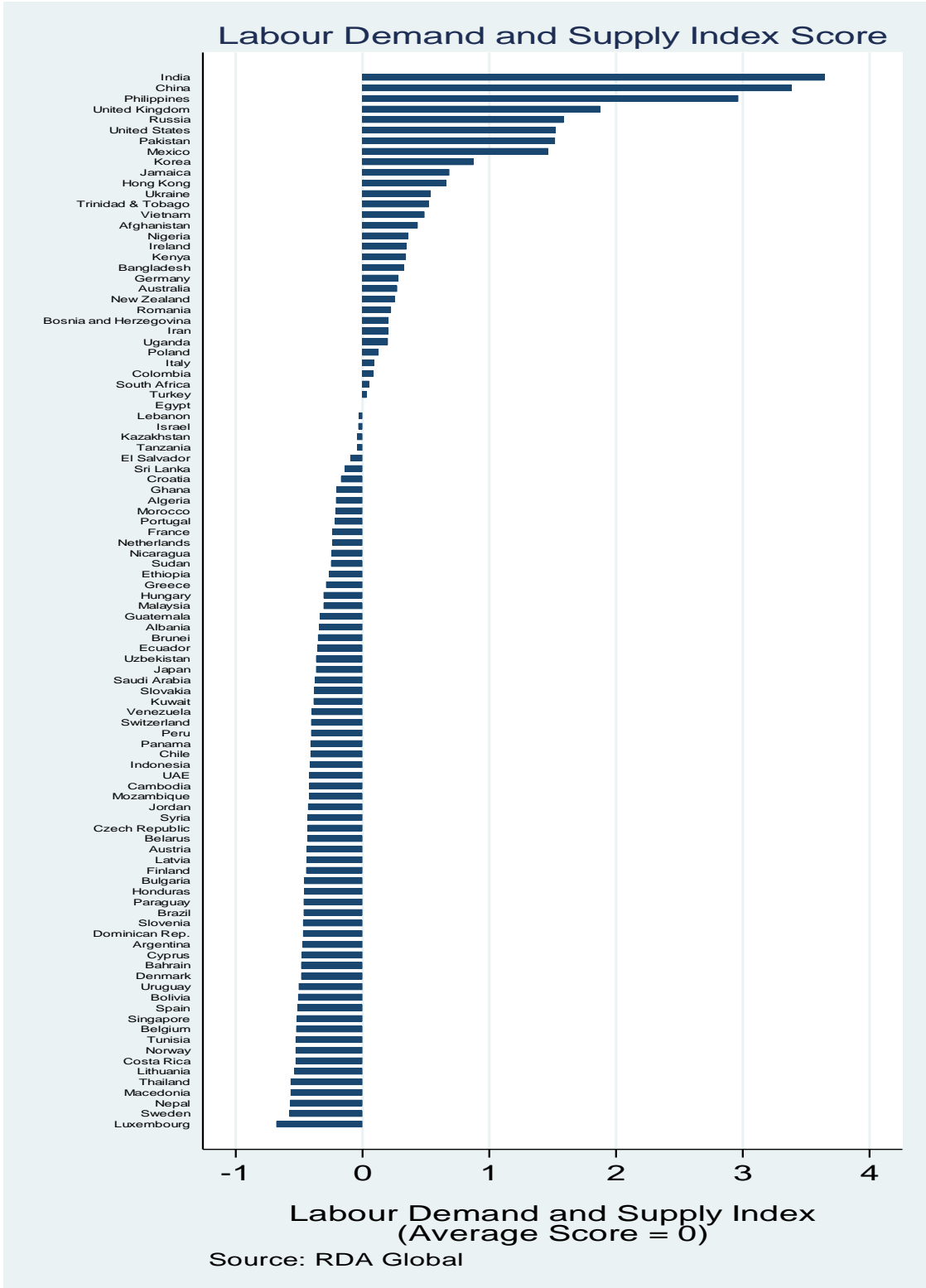


Figure 1.3 contains scores for all countries. There are forty eight (48) countries which received relatively low scores.

Low-scoring countries range from a score of -.34 (Albania) to -.68 (Luxembourg). It is notable that scores for low-scoring countries are not strongly differentiated from one another. Unlike high-scoring countries, there were no low-scoring countries with strongly low scores.

It is also noteworthy that the scores for countries are not evenly balanced in the sense that there are 31 countries with higher than average (positive) scores and 68 countries with lower than average (negative) scores. This suggests that much of the emigrating labour force is concentrated in a smaller subset of key supply countries.

5.2 Qualities of Immigrating Population Index

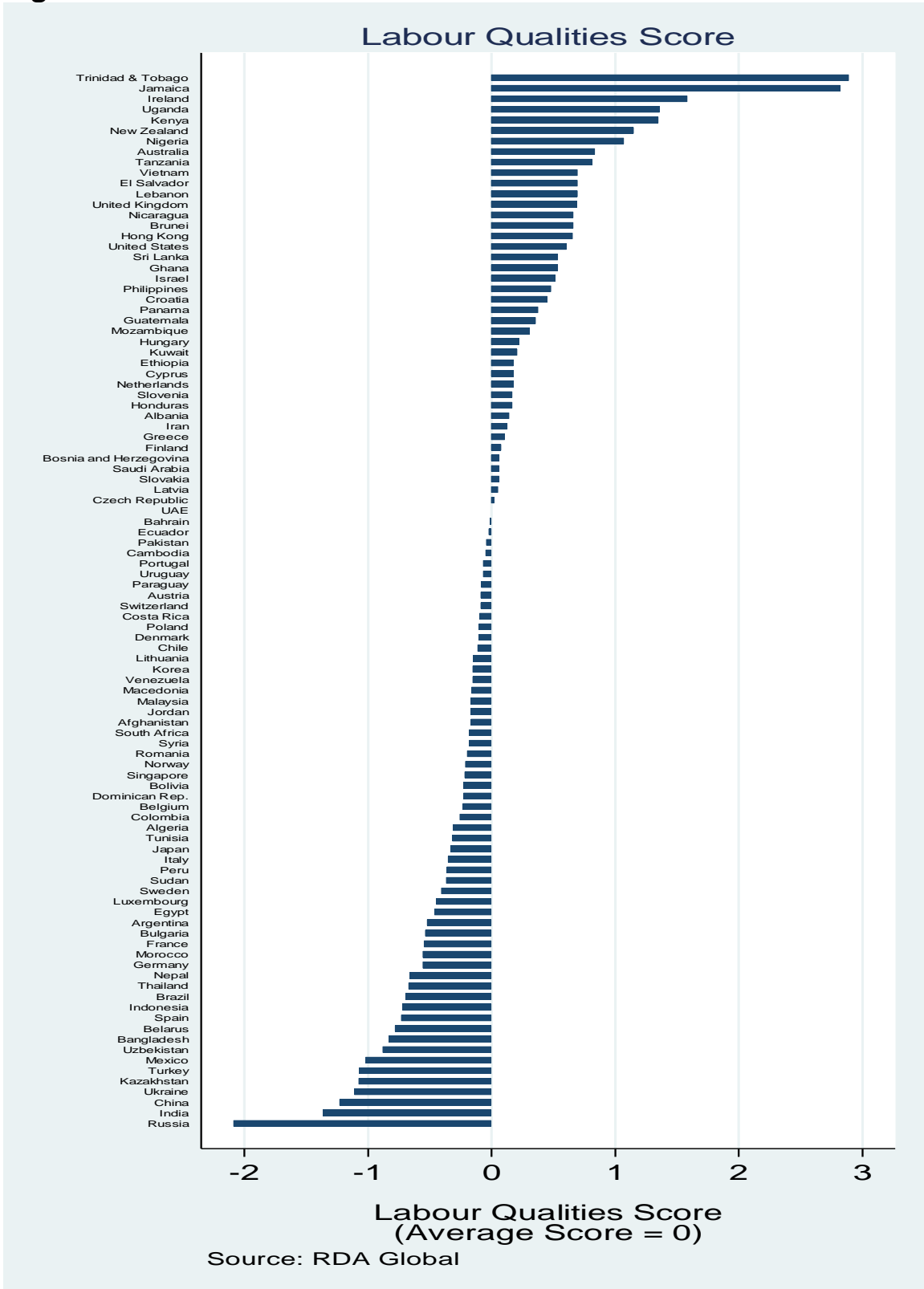
The second index captures the quality of the emigrating population informs us more about the qualities of persons from these countries that might make communication (perhaps assimilation) easier and provide for greater infusion of workers into Calgary's labour market. Those countries with populations which have greater skills (e.g. education and English language proficiency) will have a greater rank than those with emigrating populations who do not.

Scores for the Labour Qualities Index range from a high of 2.89 (Trinidad & Tobago) to a low of -2.09 (Russia). The scoring of the index is relatively evenly distributed. Countries with high scores tend to be English-speaking countries with a high rate of emigration for persons with a tertiary education.

It is interesting to note that several of the countries which scored high on the labour demand/supply index scored lowest in the labour qualities index. Countries such as China, India, Russia and Mexico all represent high levels of mobile labour supply, but may face language or cultural difficulties. They may also find that their educational qualifications present limitations when seeking work in Calgary.

Clearly, there are a large number of immigrant workers in Calgary from some countries which score relatively low on the labour qualities index. This suggests that these workers can overcome the cultural, educational, and language hurdles and successfully immigrate. Thus, it suggests that this index is probably a lesser determinant of success in immigration than the supply/demand index. In our analysis we use the index to differentiate the level of difficulty in immigration among likely sources of labour supply.

Figure 1.4 Labour Qualities Index



5.3 Additional Measures on Country Labour Supply

In order to facilitate targeted due diligence on the supply of workers, the study collected a number of measures for each country. These measures are contained in a complete country profile for each occupation. Table 1.4 contains an outline of the measures available to analyze each country prior to conducting recruiting efforts for target occupations.

Table 1.4 Key Variables contained in the Complete Country Profile

Category	Variable Name	Units	Description	Source Description
Geography	Country		Country	
	Region		World region	
	Subregion		Sub-grouping of world regions	
Occupation	Calgary Target Occupations	N/A	Target occupation groups (defined by CED)	Defined by CED
	NOC OCCUPATION (4-DIGIT)	N/A	Canadian National Occupational Classification	Statistics Canada
	NOC OCCUPATION (3-DIGIT)	N/A	Canadian National Occupational Classification	
	NOC OCCUPATION (2-DIGIT)	N/A	Canadian National Occupational Classification	
	NOC OCCUPATION (1-DIGIT)	N/A	Canadian National Occupational Classification	
Workers & Labor Force	Workers in Occupation (2007)	workers	National Employment for the specific occupation or occupational group	National Economic Census and Survey Sources, ILO, OECD, Eurostat
	Total Country Employment (2007)	workers	Total National Employment	RDA Global Economic Database, ILO
	Country Employment Growth (2007)	%	2007 National Employment Growth	RDA Global Economic Database, IMF, World Bank
	2007 Employment in Industry	workers	2007 National Employment in a selected industry	RDA Global Economic Database
	Country Unemployed Persons (2003)	persons	Persons unemployed in the country	ILO Laborstat, Country Labour Statistics Sources
	Unemployed Persons in Specific Occupation (2006):	persons	Persons unemployed in a stated employment category	ILO, Country Labour Statistics Sources
Economy	GDP Growth (2007)	%	Real GDP Growth in 2007	Country National Account Reporting, World Bank, IMF
	Nominal GDP (PPP) 2007	US\$Billions	Nominal GDP expressed in purchasing power parity	IMF
	GDP Per Capita (2005)	USD	Nominal GDP per unit population	IMF
Calgary Immigration	Immigrants to Calgary 1996-2001	persons	Total Immigrants to Calgary over the period	Statistics Canada
	Calgary Non-Permanent Immigrants (2001)	persons	Total Calgary Non-Permanent Residents by Country of Origin	Statistics Canada
	Calgary CMA Permanent Residents (2005)	persons	Total Calgary Non-Permanent Residents by Country of Origin	Statistics Canada
Canada Immigration	Immigrants to Canada (1996-2001)	persons	Total Immigrants to Canada over the period	Statistics Canada
	Canada Non-Permanent Immigrants (2001)	persons	Total Canada Non-Permanent Residents by Country of Origin	Statistics Canada
	Inflow of Workers to Canada (2005)	persons	Inflow of workers to Canada	Statistics Canada
	Inflow of Workers to Canada (2001)	persons	Inflow of workers to Canada	Statistics Canada

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Category	Variable Name	Units	Description	Source Description
Workforce Education	% of Workforce with post-secondary education (non tertiary)	%	% of Workforce with post-secondary education (non tertiary)	World Bank, Country Census Sources
	% of Workforce with Post-Secondary First Level Education	%	% of Workforce with Post-Secondary First Level Education	World Bank, Country Census Sources
	% of Workforce with Post-Secondary Second Level Education	%	% of Workforce with Post-Secondary Second Level Education	World Bank, Country Census Sources
Graduates	Total Tertiary Graduates (2005)	persons	Total Tertiary Education Graduates in Country	OECD, Eurostat ILO, Country Statistics Sources
	Total Tertiary Graduates (2000)	persons	Total Tertiary Education Graduates in Country	OECD, Eurostat ILO, Country Statistics Sources
	2000 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2001 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2002 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2003 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2004 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2005 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	2006 Graduates in Field	persons	Graduates in Stated Field	UNESCO, Country Education Statistics Sources
	Graduates in Narrow Field (2005) (OECD only)	persons	Graduates in Narrow Field (2005) (OECD countries only)	OECD
Tertiary Education Enrollment	Tertiary Education Enrollment 2001	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources
	Tertiary Education Enrollment 2002	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources
	Tertiary Education Enrollment 2003	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources
	Tertiary Education Enrollment 2004	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources
	Tertiary Education Enrollment 2005	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources
	Tertiary Education Enrollment 2006	persons	Total Enrollment in Tertiary Education Programs	UNESCO, Country Education Statistics Sources

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Category	Variable Name	Units	Description	Source Description
Total National Wage Levels (average for all workers)	Average Monthly Wages (2001)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
	Average Monthly Wages (2002)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
	Average Monthly Wages (2003)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
	Average Monthly Wages (2004)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
	Average Monthly Wages (2005)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
	Average Monthly Wages (2006)	current \$CDN	Average National Monthly Wages in Canadian Dollars for Business Sector	ILO, Country Labour Statistics Sources
Other	Total Alberta Teaching Authorities Issued (2002-2007)	Authorities Issued	Total Alberta Teaching Authorities Issued by Country of Preparation-- total issued between 2002 and 2007.	Alberta Education, Teacher Development and Certification Branch
	Specialist Physician Remuneration	Salary \$USD	Remuneration (salary) in Current US Dollars	OECD Health Statistics
	General Physician Remuneration	Salary \$USD	Remuneration (salary) in Current US Dollars	OECD Health Statistics

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For additional information about the methodology for this study, please consult the full recommendations report. Additional information on target occupations and country supply can be obtained in the database which accompanies this report.