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**Integration and “Welcome-ability” Indexes:
Measures of Community Capacity to Integrate Immigrants**

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October 11, 2013

Abstract

This paper aims at clarifying the applicability of the theory of micro-macro links to the general concept of “integration” and illustrates two distinct methods of measuring the concept at individual and community levels. In particular, two indexes are developed, the first one called welcome-ability index, to measure the capacities of communities to welcome and integrate newcomers, and the second called *integration index*, to measure economic, social, and political integration of individuals. The first, a community-level measure, takes into account opportunities and facilities, including employment opportunities, facilities for health care and positive attitudes towards immigrants. The second, an individual-level measure, takes into account the multi-dimensionality of integration, specifically, economic inclusion and parity, social recognition and belonging, political involvement that insures the legitimacy of institutions, and civic participation. The latter could be considered an outcome of the processes measured by the former. The *welcome-ability index* is illustrated with data gathered for a project that collated baseline information on Ontario communities served by local partnerships specifically tasked with enhancing the capacities of communities to welcome newcomers. These data were gathered from the 2006 Canadian Census, 2008 Canadian Community Health Survey, Ontario 211 (a service provider database), and City Plans and Policies. The *integration index* is developed with data from the 2008 Canadian General Social Survey on Social Networks. The paper concludes with suggestions for future research directions by extending the theory of macro-micro links involved in studies of integration.

1. Integration, a Multi-Dimensional Concept

Integration is a concept that is widely used and is defined in several ways. In the introductory chapter on *“Integration of Newcomers: International Approaches”*, George (2006:3) notes that definitions of integration vary considerably, and that there is an “absence of a widely-accepted definition of what constitutes integration”. Even so, we venture to select definitions of integration that we see as amenable to measuring the concept.

In a general sense, to “integrate” is to “bring or come into equal participation in or membership of society” (Canadian Oxford Dictionary, 1998). While integration can be applied to all individuals, it is often used with reference to immigrants and the receiving country. Thus, the European Commission views integration “as a two-way process based on mutual rights and corresponding obligations of legally resident third country nationals and the host society which provides for full participation of the immigrant” (Entzinger and Biezeveld, 2003 quoting European Economic and Social Council 2003: 17-18; Spencer, 2006: 3). Likewise, Joppke and Seidle (2012: 9) define immigrant integration “as a process through which newcomers become capable of participating in the economic, social and civic/political life of the receiving country”. This last definition explicitly includes the domains in which immigrants are expected to participate.

Integration is also often juxtaposed to *assimilation*. These terms are most often used in the literature examining policies on multiculturalism (see for example, Winnemore and Biles, 2006), and is best understood with the typology of acculturation strategies proposed by John Berry (2008: 51): *assimilation* is when “individuals do not wish to maintain their cultural identity and seek daily interaction with other cultures” whereas *integration* is when “there is an interest in maintaining one’s original culture while in daily interactions with others”. For integration “there is some degree of cultural integrity ... while the person seeks at the same time ... to participate as an integral part of the larger social network.” The other two typologies of acculturation described by Berry are: *separation* “when individuals place a value on holding on to their original culture, and at the same time wish to avoid interaction with others”, and *marginalization* “when there is little possibility or interest in cultural maintenance ... and little interest in having relations with others.” Viewed in this way, integration is more narrowly defined as it focuses mainly on the social dimension of integration (Ravanera and Rajulton, 2009). That is, this definition takes into account the identity or cultural dimension and not the structural or instrumental dimensions of integration, the latter referring mainly to economic and political integration.

While integration has thus far been defined as an individual trait, it is often used as a characteristic of a society. As noted by Entzinger and Biezeveld (2003:6) in their report to the European Commission, *Benchmarking in Immigrant Integration*, “The more a society is integrated, the more closely and the more intensely its constituent parts (groups or individuals) relate to one another.” They went on to state that “the term *social cohesion* has become widely used as an equivalent for integration as a characteristic of a society.” However, for conceptual clarity – particularly in attempts to measure these concepts – it is important to distinguish integration from social cohesion: the former is a characteristic of individuals and the latter that of aggregates, such as communities or societies.

Social cohesion, like integration, is a multi-dimensional concept. Entzinger (2000: 105) notes that the most important domains are the legal and political, the social and economic, and the cultural domain. Bernard (1999) proposed that the concept of social cohesion has six dimensions under three domains: *inclusion* and *equality* (economic domain), *recognition* and *belonging* (social domain), *legitimacy* and *participation* (political domain). Rajulton, Ravanera and Beaujot (2007) made use of these dimensions

to measure social cohesion of Canadian cities, an *aggregate-level* analysis. These same dimensions were used at an *individual-level* to examine Canadian youth integration (Ravanera, Rajulton and Turcotte, 2003), integration at mid-life (Ravanera and Rajulton, 2003), and integration over the life course (Ravanera and Rajulton, 2006); though the number of dimensions included in the analysis varied with the availability of information from the survey data. In these studies, individuals, not just immigrants, were the units of analysis.

Regardless of the levels of analysis, these studies also showed that the dimensions are inter-related. Ravanera and Rajulton (2006), for example, found that political participation is positively associated with social belonging. These inter-relationships between dimensions and domains were also captured by parameters of structural equations model used to measure social cohesion (Rajulton, Ravanera, and Beaujot, 2007). The inter-relation of integration measures is best reflected in the Migrant Policy Integration Index. As noted by Joppke and Seidle (2012: 21), the index uses 148 indicators in seven policy areas to arrive at a “multi-dimensional picture of migrants’ opportunities to participate in society by assessing governments’ commitments to integration”.

The multi-dimensionality of integration is recognized when studies on integration are preceded by a descriptive adjective, such as, “economic integration” (see for example, Sweetman and Warman, 2008), “social integration” (Frideres, 2008), and “political integration” (Anderson and Black, 2008). Furthermore, some researchers include more than one domain of integration in their studies. Following the integration typology proposed by Ray (2002), for example, Jebwab (2006) examined the economic and linguistic integration of Canadians. Reitz and Banerjee (2007) examined the economic and social integration not only of the immigrants but also their children using extensive indicators that included income, perceived discrimination, belonging, volunteering, and voting. However, neither study made an attempt to put together the different dimensions into one measure of integration. In a comprehensive volume, *Immigration and Integration in Canada in the Twenty First Century*, editors Biles, Burstein and Frideres (2008:9) point to the separation of the studies of the dimensions as a weakness : “The separation tells us whether economic deprivation is increasing and whether political isolation is deepening; but it does not tell us whether these conditions are converging in the same individual and thus contributing to a more profound isolation than if two different individuals were affected.”

In this study, we use the domains and dimensions laid out by Bernard (1999) in an attempt to come up with cohesive measures for both the aggregate (here, communities) and individual levels, depending on the availability of data at each level. To avoid confusion, from here on, we use the term “*integration*” as an individual-level concept and the term “*welcome-ability*” as an aggregate-level concept to refer to the characteristic of communities that enables them to welcome and integrate newcomers. As the focus of our analysis is mainly on immigrants, we prefer the use of “*welcome-ability*” over “*social cohesion*”, a term with broader scope that we bring in again toward the end of the paper.

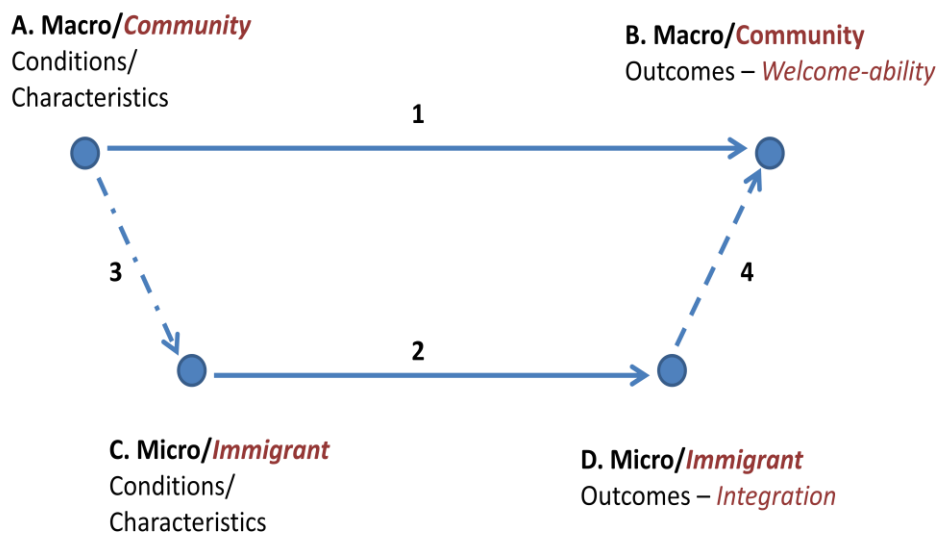
2. A Theoretical Multi-level Framework for Analysis of Integration

Figure 1 illustrates the distinction between the concepts of *welcome-ability* and *integration* and the community (macro-) and individual (micro-) levels of analysis. The framework, originally proposed by Coleman (1990), and subsequently elaborated upon by other scholars, is ideally suited for developing and validating theories of social behaviours at the macro and micro levels and the inter-relationships between them. One example cited by Coleman is the “frustration theory” of revolution that attempts to explain why revolutions seem to happen when conditions are generally improving (a macro-level

proposition). This theory argues that improving conditions create frustration among individual members, which then leads to aggression (a micro-level relation) and on to revolution (by simple aggregation of individual aggression)¹. (For a recent review of Coleman’s schema and examples of various models that take micro-macro links into account, see Raub, Buskens and van Assen, 2011).

We are not in a stage wherein we could posit theories about social processes that lead to welcome-ability and integration. However, the schema presented in Figure 1 is useful for exploring conditions and characteristics that could lead to patterns of outcomes in communities and individuals. Both macro to macro and micro to micro relations are straight forward. That is, arrow 1 indicates that certain community conditions or characteristics could lead to that community’s ability to welcome immigrants, and that individual-level traits influence an individual’s ability to integrate into society (arrow 2). This paper focuses on these macro to macro and micro to micro relations separately by using different data sets.

Figure1: Theoretical Macro-Micro Framework of Analysis of Immigrant Integration
 Patterned after Coleman (1990) and elaborated on by Raub, Buskens and van Assen (2013)



Exploring the influence of macro on micro-level conditions or characteristics is now often done particularly with the availability of multi-level data as well as statistical techniques of analysis. This relationship represents opportunities or constraints on individuals arising from the environment or society that they are in. This is shown in Figure 1 as arrow 3 and referred to by Raub, Buskens and van Assen (2013) as “bridge assumptions”.

¹ However, Coleman did point out that revolution is more than just an aggregation of individual aggression as it involves organization and inter-play among the actors.

In *Social Integration over the Life Course: Influences of Individual, Family, and Community Characteristics*, for example, Ravanera and Rajulton (2006) found that the community's age-structure, availability of opportunities, and predominance and homogeneity of values have influence on integration. While it is apparent that community characteristics do influence immigrant integration, this paper does not formally explore community effects on integration due to a lack of appropriate data. Likewise, the paper does not include an analysis of how integration of immigrants influence the ability of communities to welcome newcomers; that is, the influence of the micro outcomes on the macro outcomes, shown in Figure 1 as arrow 4 and referred to as "transformation rules" by Raub, Buskens and van Assen. However, we make reference to these relationships towards the end of the paper where we attempt to make recommendations for measuring and monitoring the ability of communities to integrate immigrants.

2a. An Application of the Theoretical Framework at the Community Level

The three big Canadian cities - Toronto, Montreal, and Vancouver – have been the major destinations of immigrants to Canada, but in recent years, smaller cities and municipalities have been working towards attracting more immigrants. One such initiative is the Local Immigration Partnerships in the province of Ontario aimed at enhancing the capacities of communities to welcome immigrants by planning and undertaking projects that increase labour force access, social inclusion, and civic participation of newcomers.

In order to measure the progress of the initiative of welcoming immigrants, Citizenship and Immigration Canada commissioned researchers at Western University (including the authors) to gather baseline data on Ontario communities that have established Local Immigration Partnerships (Ravanera, et al., 2010). This paper makes use of the baseline data to explore the development of an index that we hope will be useful in measuring the progress of the processes and outcomes of the Local Immigration Partnerships.

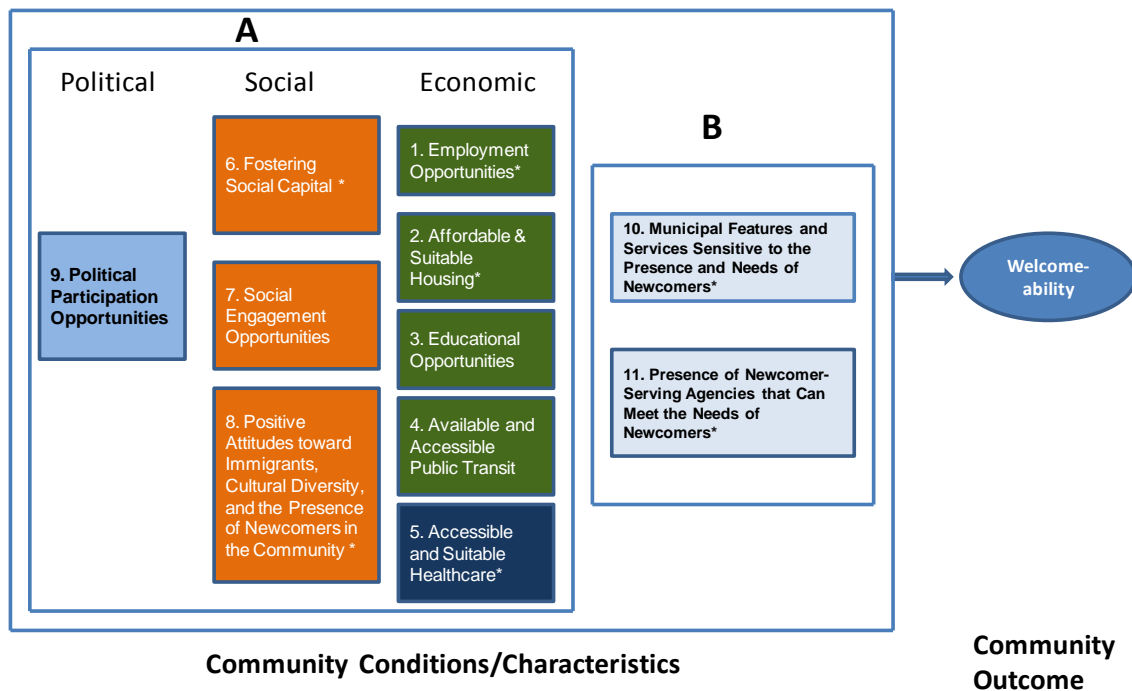
Recent attempts to measure the capacities of communities to integrate immigrants cover a wide range of geographic configurations. The "Indicators of Immigrant Integration: A Pilot Study" (European Commission, 2011), for example, had country as its unit of analysis, with data for 27 European Union countries. In the "California Immigrant Integration Score Card" (Pastor, et al., 2012), 10 counties were the focus. In this paper, our units of analysis are cities and municipalities (referred to in the Census as *Census Divisions*) and counties (*Census Subdivisions*) in the province of Ontario.

For gathering the above-mentioned baseline data, we used as a guideline the "Characteristics of a Welcoming Community" report (Esses, et al., 2010), a study that reviewed some 200 scholarly articles and chapters, and government and community reports, to examine the best practices for creating welcoming communities. The review identified 17 characteristics of a *welcoming community* defined as: "a location that has the capacity to meet the needs and promote inclusion of newcomers, and the machinery in place to produce and support these capacities" (Esses et al., 2010: 9). In this paper, we make use of indicators based on these 17 characteristics – for those for which we were able to find data from sources available to us.

Figure 2 expands the macro to macro relationship shown in Figure 1; that is, the community conditions and characteristics (items in the box, which are based on Esses et al., 2010) that could influence the abilities of communities to welcome and integrate immigrants (or *welcome-ability*, the outcome).

The characteristics in Box A represent opportunities and facilities, grouped into three domains: economic/ functional (green/dark blue), social (orange), and political (light blue). The economic domain includes employment opportunities, availability of affordable housing, educational opportunities, availability of health care services, and transportation facilities. The social domain encompasses opportunities that foster social capital and social engagements, and positive attitude toward immigrants. Finally, the political domain represents opportunities for political engagement and participation. In Box B are municipal or city features that may promote the use of the opportunities and facilities by immigrants, namely presence of serving agencies, and features and services sensitive to the needs of newcomers. If the data are available to link community characteristics to individuals, items in Box B could be potentially considered as a “bridge” between the macro and micro conditions (shown as arrow 3 in Figure 1).

Figure 2: Framework for Analysis at the Macro-level



In Section 3, we describe the community-level data, present our analysis through the use of structural equations modelling, and discuss results including the latent variables derived to represent the ability of communities to welcome and integrate immigrants, which we refer to as *welcome-ability index*.

2b. An Application of the Theoretical Framework at the Individual Level

While the ability of communities to welcome newcomers is of particular interest to policy makers and those providing services, the ultimate outcome sought for is the integration of immigrants. Newcomers

have characteristics or conditions that indicate how well they are integrated in the community. It is possible that the conditions in the communities may be seen as welcoming, and yet immigrants may not actually be integrated as desired. Thus, we take the further step of making an analysis at the individual or micro-level. Figure 3 expands the micro to micro relationship, shown in Figure 1 as arrow 2, using the dimensions of integration described earlier.

Figure 3: Framework for Analysis at the Micro-level

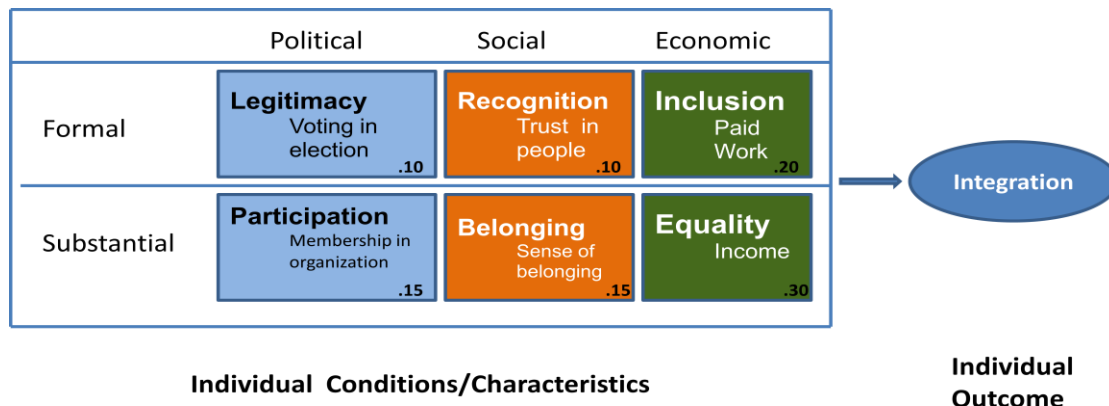


Figure 3 is based on the six dimensions of social cohesion proposed by Bernard (1999) and Jensen (1999), and thus, are more appropriate at an aggregate or societal level. To make these dimensions meaningful at the individual level, we included in Figure 3 the possible indicators of each dimension. Thus, for example, *legitimacy* refers to whether political organizations and leaderships duly represent their constituents. Such legitimacy can be brought about by citizens exercising their political rights of citizenship, including the right to vote. While there could be other indicators of these six dimensions, we have chosen indicators for which information are usually gathered in social surveys.

In Section 4, we describe the individual-level data, present our analysis, and discuss results which we refer to as an *integration score or index*.

3. Welcome-Ability Index: An Illustration Using Community-Level Data

3a. Data and Method for deriving the index

Censuses are the most likely to have data for small geographic areas, and to have collected information on economic and non-economic indicators of community characteristics. Though national surveys such as the General Social Surveys gather information on topics relevant to characteristics of welcoming communities – such as sense of belonging, voting behavior, and social involvement – data from most of the surveys could not be used because the number of respondents for each of the areas covered by the Local Immigration Partnerships (LIPs) are not sufficiently large to allow computation of reliable estimates. One exception is the Canadian Community Health Survey (CCHS). Its 2008 round has a total of 132,000 respondents, 44,460 of whom are from Ontario, and asked questions on life satisfaction and sense of belonging, two indicators that we deemed important in assessing community characteristics (Statistics Canada, 2009).

The publicly available files of the 2006 Census and the 2008 CCHS do not allow indicators to be broken down by immigration status² or by small geographic units that make up the LIP communities within Toronto and a few of the newly established Ontario LIPs. To overcome these limitations, the 2006 Census and the 2008 CCHS restricted data files were accessed through Statistics Canada's Research Data Centre.

In deriving data for the communities, the geographic boundaries of the Local Immigration Partnerships were first determined. The 31 LIPs in Ontario, including Toronto as a whole, cover cities, counties, or a combination of both, which, in Census geographical terms, are referred to as Census Divisions (CD), Census Subdivisions, or a combination of both. Within the City of Toronto, there are 15 LIPs, 8 of which have boundaries that coincide with identifiable Census Tracts (CTs). The other 7 LIPs have boundaries that cover a mix of CTs and Dissemination Areas within certain CTs. In the analysis, we have included a total of 45 communities; that is, 30 LIP-covered areas in Ontario and 15 within Toronto³.

The index of welcome-ability presented here follows the method we developed for social cohesion (Rajulton, Ravanera, and Beaujot, 2007). The method requires several variables (or indicators) to measure the three domains – Economic, Social and Health welfare of communities. There were no indicators on the political domain from both the Census and the CCHS; however, there were several variables on health, and thus, we included a health domain, which in Figure 2 is listed under the economic domain. For the analysis at the community level, we therefore have used the two domains suggested in Bernard (1999): Economic and Social, and added a Health domain.

From among the several indicators available from the baseline data obtained for measuring the outcomes of 45 Local Immigration Partnerships in the province of Ontario (see Ravanera et al., 2012), we selected 18 for exploratory and confirmatory factor analyses to identify a relatively small number of unobserved “factors” or “latent variables” that represent relationships among the variables. The exploratory factor analysis helps identify latent constructs underlying the observed indicators. The confirmatory factor analysis (also known as structural equations modeling - SEM) helps examine the existence of and relationships among theoretically established latent constructs – the three domains mentioned above - from the available indicators. The structural equations model also helps evaluate the measurement errors associated with indicators, and their reliability. More importantly, SEM yields the error (co)variances between the selected indicators and the underlying constructs, which then help reformulate and refine hypothesized theoretical relationships between the constructs. Out of the 18 indicators, the exploratory and confirmatory factor analyses resulted in selecting 8 robust indicators for further analysis. Table 1 lists all the indicators initially considered and those finally selected through structural equations models.

² There were other data obtained for LIP communities such as data from the Ontario Education Quality and Accountability Office, the internet website – namely the Ontario 211 for information on services available to newcomers, and the websites of cities and municipalities - and from a survey of opinion leaders done by Lavinia Tossutti and Victoria Esses (2011). These data were useful as baseline for the LIP communities but they did not prove useful for inclusion in the statistical model used in this paper.

³ The 15 Toronto LIPs have now been reconfigured into 5.

Table 1: Variables used in the exploratory factor analysis (EFA) and those selected for confirmatory factor analysis (CFA)			
N.B. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = 0.784			
Domain	Variable	Variable Description	Selected for CFA
Economic	EMPRATE	Percentage of employed immigrants	
	UNEMPRATE	Percentage of unemployed immigrants	
	HHINC	Household Income ('000s)	Yes
	LICO	Low Income Ratio among immigrants	Yes
	RENTIMMIG	Percentage of immigrants renting homes	Yes
	MEDRENT	Median monthly rent immigrants pay ('00s)	
	DWELLHHINC	Ratio of dwelling value to median HH income	
Social	VISMIN	Percentage of visible minorities among immigrants	Yes
	PERIMMIG	Percentage immigrants in the community	Yes
	SBIMMIG	Sense of Belonging of immigrants on a scale of 100	
	POPDIV	Population Diversity in the community	Yes
	MUNSER	Municipal services available in the community	
	N211	N211 services in the community	
	N211PERIMMIG	Number of immigrants per N211 service	
Health	HEALTHBAR	Percentage of immigrants who perceive barriers in improving health	
	COMHGOOD	Percentage of immigrants rating health care in the community as good or excellent	Yes
	PERHEALTH	Immigrants' perceived health on a scale of 100	Yes
	IMMIGDOC	Percentage of immigrants who have a regular doctor	

The indicator HHINC (immigrant household income) is theoretically expected to have a positive relationship, while the other two indicators LICO (percentage of immigrants falling below the low-income cut-off) and RENTIMMIG (percentage of immigrants living in rented dwellings) are expected to have dampening or negative relationship with the Economic welfare of communities. All the three selected indicators for the Social domain – VISMIN (percentage of visible minorities among immigrants), PERIMMIG (percentage of immigrants in the community), and POPDIV (population diversity in the community) – are expected to have positive relationship with the Social welfare of communities. Similarly, the two selected indicators for the Health domain⁴ – COMHGOOD (percentage of immigrants rating health care in the community as good or excellent) and PERHEALTH (immigrants'

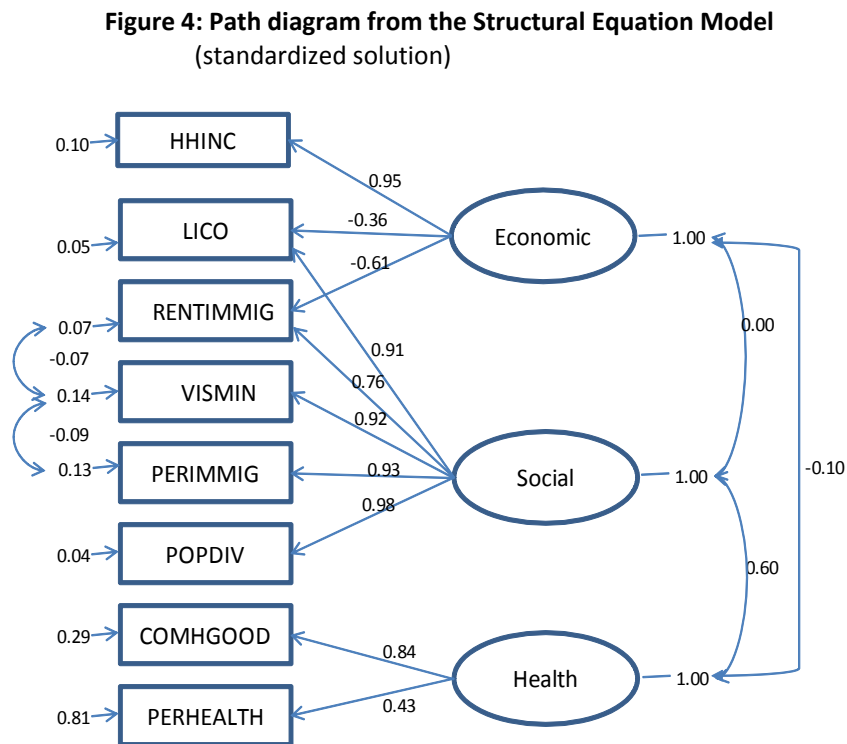
⁴ Ideally, in Structural Equations Models, at least three indicators should be used for each latent variable. Most of the indicators available for the Health domain were rather weak, and only two could be finally selected for a robust model.

perceived health) are expected to have positive relationship with the Health welfare of communities. From the classical theory of migration, all these indicators serve either as pull or push factors of these communities - in other words, as welcoming or non-welcoming characteristics of these communities – which immigrants consider before settling in these communities.

The next step towards deriving an index of welcome-ability is to transform the latent scores on the three domains (Economic, Social, and Health) obtained from the structural equations models into one and the same metric such that they all have a common distribution, that is, all three distributions will have (almost) the same means, variances, skewness, and kurtosis. This is an important step and is explained below. The last step would be to derive an overall index of welcome-ability from the domain indices by assigning appropriate weights for each domain.

3b. Latent Scores on the Three Domains - Structural Equations Model (SEM)

The overall index of welcome-ability needs to be calculated from the three domain indices, which in turn are to be calculated from the selected indicators. Figure 4 presents the path diagram from SEM and Table 2 presents the path coefficients and goodness of fit statistics from SEM, including those suggested by modification indices.



All the goodness-of-fit statistics given at the bottom of Table 2 confirm that the model is a good fit. The p-value of chi-square statistic should not be significant for a good model fit, which criterion is met here.

The RMSEA value is only slightly higher than the usually suggested value of 0.05. The normed and relative fit indices are equal to or higher than the suggested value of 0.9.

As seen in Table 2, all the path coefficients associated with the original indicators are in the theoretically expected directions and most of the standardized path coefficients are 0.75 or higher, assuring that the selected indicators are good in capturing the latent dimensions of interest. The three exceptions with lower coefficient values are: Economic → LICO, Economic → RENTIMMIG, and Health → PERHEALTH. The corresponding R-square values measure the reliability of the indicators, and they suggest the adequacy of the indicators selected for the latent variables Economic and Social. The indicators for the latent variable Health fall short of the ideal; still, we have retained them in the model for lack of any better indicators available in the community baseline dataset. Future studies need to focus on measuring good and more reliable indicators for the Health domain.

Table 2: Path coefficients from the Structural Equations Model

N.B. Paths with * denote extra paths suggested by the modification indices

Paths	Unstandardized Coefficient	Std Error	Standardized Coefficient	R-square
Economic → HHINC	6.74	0.84	0.95	0.90
Economic → LICO	-2.88	0.44	-0.36	0.95
Economic → RENTIMMIG	-9.20	1.22	-0.61	0.93
Social → VISMIN	23.49	2.91	0.92	0.86
Social → PERIMMIG	18.44	2.24	0.93	0.87
Social → POPDIV	18.12	2.02	0.98	0.96
Social → LICO *	7.33	0.84	0.91	0.95
Social → RENTIMMIG *	11.50	1.44	0.76	0.93
Health → COMHGOOD	9.04	2.49	0.84	0.71
Health → PERHEALTH	2.67	1.08	0.43	0.19
Significant error covariances				
VISMIN ↔ RENTIMMIG	-28.10	8.51	-0.07	
VISMIN ↔ PERIMMIG	-45.59	12.32	-0.09	
Effective Sample Size	45			
Deg of freedom	13			
Chi-square	16.26			
P-value	0.24			
RMSEA	0.076			
90% CI for RMSEA	(0.0; 0.18)			
Normed Fit Index	0.95			
Relative Fit Index	0.90			

The path coefficients indicated by an asterisk in Table 2 denote those suggested by modification indices that connect the manifest and latent variables over and beyond what is “theoretically” expected. The LISREL package suggested connecting LICO and RENTIMMIG to the Social domain (with positive coefficients). These two indicators were theoretically expected to capture the latent Economic domain, with negative relationships (that is, high percentage of immigrants falling below the low-income cut-off and a high percentage of immigrants only renting their dwellings instead of owning them are not salubrious for the Economic welfare of communities). The additional paths suggested by the modification indices are interesting and call for deeper theoretical understanding of these economic indicators. The realities captured by these two indicators may not be good for the economic welfare of communities, but these realities may serve well for the Social welfare of communities, for example, through felt-togetherness and proximity of living. Certainly, economic realities are not the same as social realities, and certain indicators can capture diverse realities at the same time. In fact, a surprising finding in Table 2 is the much stronger relationship of these two indicators with social reality than with economic reality, as shown by the higher values of standardized path coefficients for Social → LICO and Social → RENTIMMIG (0.91 and

0.76 respectively) than for Economic → LICO and Economic → RENTIMMIG (0.36 and 0.61 respectively). [Note that these standardized coefficients can be compared directly since they are in the same structural equations model.]

3c. Domain Scores and Overall Index of Welcome-ability

The relationships and error (co)variances identified by the structural equations model can be used to estimate the latent scores for each domain. Unlike the factor scores produced by exploratory factor analysis, these latent scores (from structural equations models) are not orthogonal since the model suggests some relationships between the indicators identified under each domain.

These latent scores are usually in a standardized form and therefore will have a mean of zero and standard deviation of 1. Some scores will be positive and others negative. Negative scores stand for lower welcome-ability and positive scores for higher welcome-ability. The latent scores for the three domains range from -0.3 to 2.3, from -1.3 to 1.9, and from -1.5 to 1.6 for the Economic, Social and Health domains respectively (see Appendix Table 1, minimum and maximum columns). Although the (standardized) latent scores have the same mean (=0) and variance (=1), they can have different measures of skewness and kurtosis for each domain. As seen in Appendix Table 1, the measures of skewness and kurtosis vary a lot not only in their magnitudes but also in their directions. It is necessary, therefore, to convert all the distributions into one and the same metric, so that they all have the same mean, standard deviation, skewness and kurtosis (in other words, they all have a common distribution)⁵. Using a common distribution for all the three domains is necessary to safeguard against many pitfalls. One such pitfall, for example, occurs when we combine the three domain scores into a single score as an overall index of welcome-ability; a high score in one domain can be fully cancelled out by a low score in another domain simply because of the differences in their distributions. In order to convert all the distributions into one and the same metric, we can transform either the latent scores themselves or their ranks into a common distribution. We use the latter procedure in this study and transform the ranks into an exponential distribution - the details are given in the Appendix.

Finally, the exponentials of ranks for each domain are combined to give an overall index of welcome-ability. A practical problem at this stage is to decide on appropriate weights to use to combine the domain scores. We use weights of 50% for the Economic, and 25% each for the Social and Health Domains. The Economic domain is assigned a greater weight because discussions in the extant literature on welcome-ability (as well as on integration/cohesion or inclusion/exclusion) predominantly focus on the economic aspect, justifiably so because when the economic welfare is weak in a society, many other systems also become weak, in turn giving rise to weak social togetherness and welfare. Obviously,

⁵ Other methods of combining dimensions are possible. In an earlier study to measure welcome-ability, Ravanera (2012) made use of “*location quotient*”; that is, the value for an indicator is made relative to the value for the whole province of Ontario. The results were largely similar to the results obtained above.

In the report, *City Magnets II: Benchmarking the Attractiveness of 50 Canadian Cities*, the Conference Board of Canada (2010:8-9) first ranked the performance of cities on each of their indicators using a report card style (A-B-C-D), obtained a normalized value to get a category ranking for each indicator, and then calculated an overall performance using weighted value of the normalized scores for all the categories. In the *California Immigrant Integration Scorecard: Technical Report*, Pastor *et al* (2012: 32-33) assigned a score of 1 to 5 for each indicator based on the standard deviations above or below the mean value across all the regions compared; average scores were then computed for each category, and overall scores computed as simple average across the categories.

assigning different weights would produce different results. For the moment we leave the weights as suggested above, although the standardized path coefficients estimated through SEM show greater importance and relevance of the indicators of the Social domain (see above, Table 2). The descriptive statistics of rank scores, transformed scores and of the overall index are all shown in Appendix Table 1. As an illustration, Appendix Figure 1 shows the distribution of the original latent scores and the exponentially transformed scores, for the Economic domain (scores for the other two domains follow the same shape and pattern).

Table 3 presents the exponentially transformed scores for each domain and the overall welcome-ability index, as well as their ranks. As seen in the table, York region holds the first rank in the Economic index, fourth rank in the Health index but only the 14th rank in the Social index. Because of the weights used, it comes out with the first rank in the overall index of welcome-ability.

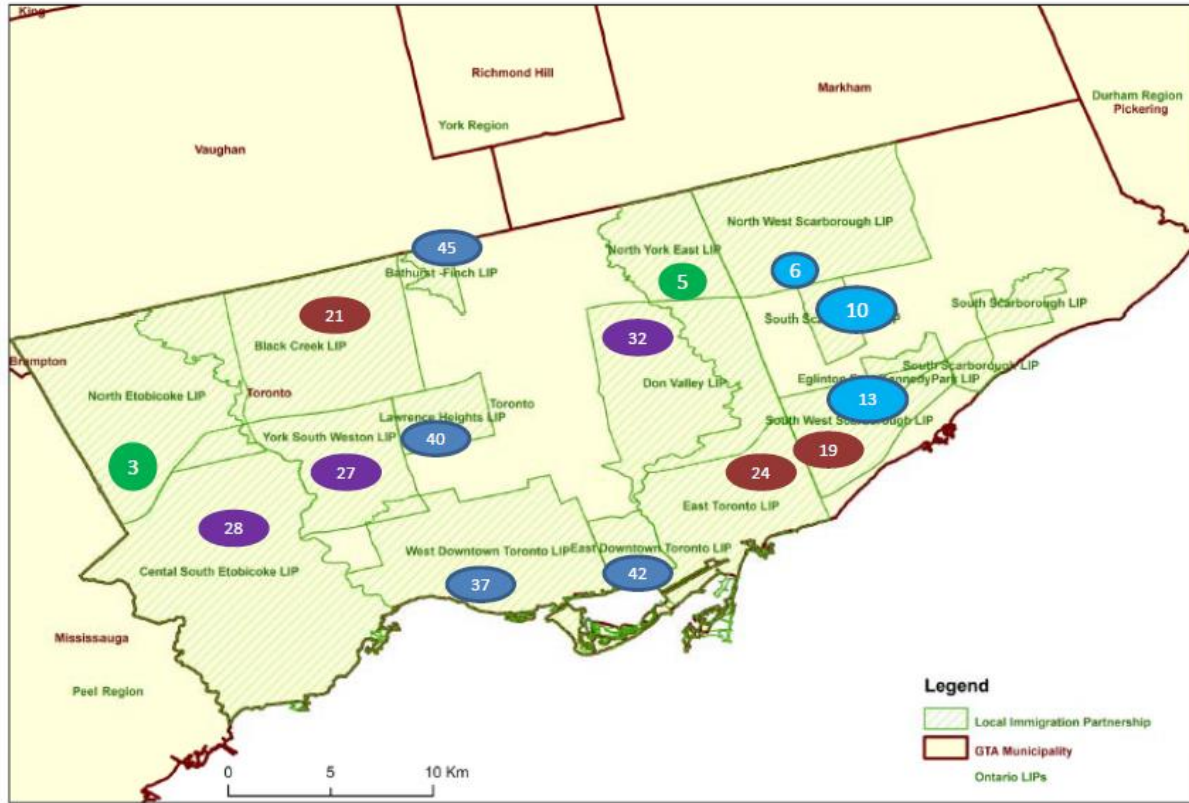
Among the first five ranks in the Economic welfare, not surprisingly two of them are in the Toronto GTA region (Northwest Scarborough and South Scarborough), Durham and Peel regions holding the 2nd and 4th ranks. Although Northwest Scarborough holds the first and second ranks in the Social and Economic domains, its somewhat low rank (27th) in the Health domain pulls down its overall welcome-ability to the 6th place. A similar pattern is to be seen also for South Scarborough: it holds the 5th and 2nd ranks in the Economic and Social domains but only 35th rank in the Health domain, consequently its overall welcome-ability index stands at the 10th place.

Another striking feature of all these domain indices and the overall index is that regions outside of Toronto GTA hold very low ranks in the Social and Health domains. And, among the Toronto GTA regions, Bathurst-Finch holds the lowest rank in the Economic domain but not very low ranks in the other two domains (19th and 7th ranks in the Social and Health domains respectively). However, because of the weights used, its overall index of welcome-ability is pulled again to the lowest rank.

Table 3: Exponential scores and ranks for each domain, and the overall welcome-ability index and rank

Local Immigration Partnership	Economic Score	Social Score	Health Score	Welcome-				
				Economic Rank	Social Rank	Health Rank	ability Index	Index Rank
York Region	0.58	7.59	2.00	1	14	4	2.69	1
Peel Region	1.52	5.16	3.00	3	10	6	2.80	2
North Etobicoke, Toronto	4.05	2.49	6.34	8	5	12	4.23	3
Durham	2.00	9.62	4.05	4	17	8	4.42	4
North York East, Toronto	8.24	3.00	1.04	15	6	2	5.13	5
North West Scarborough, Toronto	1.04	0.58	18.46	2	1	27	5.28	6
Halton	3.00	15.38	0.58	6	24	1	5.49	7
Guelph - Wellington	4.60	16.35	4.60	9	25	9	7.54	8
Windsor - Essex	5.74	11.89	12.71	11	20	21	9.02	9
South Scarborough, Toronto	2.49	1.04	30.22	5	2	35	9.06	10
Ottawa	16.35	6.95	1.52	25	13	3	10.29	11
Waterloo Region	11.89	12.71	7.59	20	21	14	11.02	12
Eglinton East - Kennedy Park, Toronto	13.56	1.52	16.35	22	3	25	11.25	13
Simcoe County	3.52	24.97	23.49	7	32	31	13.87	14
Hamilton	18.46	14.45	15.38	27	23	24	16.69	15
Grand Erie	6.34	28.31	26.57	12	34	33	16.89	16
Niagara	11.11	19.60	28.31	19	28	34	17.53	17
Kingston	22.11	17.38	13.56	30	26	22	18.79	18
South West Scarborough, Toronto	30.22	3.52	11.89	35	7	20	18.96	19
Sarnia - Lambton	12.71	34.68	17.38	21	37	26	19.37	20
Black Creek, Toronto	32.32	4.60	8.24	36	9	15	19.37	21
London - Middlesex	24.97	13.56	14.45	32	22	23	19.49	22
Renfrew & Lanark	6.95	44.08	24.97	13	40	32	20.74	23
East Toronto	34.68	5.74	10.35	37	11	18	21.36	24
North Bay	15.38	20.82	37.35	24	29	38	22.23	25
Quinte	8.92	23.49	48.54	16	31	41	22.47	26
York South-Weston, Toronto	37.35	6.34	11.11	38	12	19	23.04	27
Central South Etobicoke, Toronto	40.43	10.35	5.16	39	18	10	24.09	28
Chatham - Kent	28.31	32.32	9.62	34	36	17	24.64	29
Greater Sudbury	26.57	26.57	19.60	33	33	28	24.83	30
Thunder Bay	14.45	40.43	32.32	23	39	36	25.41	31
Don Valley, Toronto	48.54	4.05	2.49	41	8	5	25.91	32
Five Eastern Counties	5.16	18.46	76.27	10	27	44	26.26	33
Peterborough	10.35	30.22	54.30	18	35	42	26.30	34
Leeds & Grenville	9.62	54.30	44.08	17	42	40	29.41	35
St.Thomas-Elgin	19.60	62.41	22.11	28	43	30	30.93	36
West Downtown Toronto	54.30	8.24	8.92	42	15	16	31.44	37
Northwestern Ontario	7.59	48.54	62.41	14	41	43	31.53	38
Smith Falls	44.08	22.11	20.82	40	30	29	32.77	39
Lawrence Heights, Toronto	62.41	8.92	6.95	43	16	13	35.17	40
Sault Ste. Marie	17.38	90.00	34.68	26	45	37	39.86	41
East Downtown Toronto	76.27	2.00	5.74	44	4	11	40.07	42
Huron County	23.49	76.27	40.43	31	44	39	40.92	43
Timmins	20.82	37.35	90.00	29	38	45	42.25	44
Bathurst-Finch, Toronto	90.00	11.11	3.52	45	19	7	48.66	45

Figure 6: Map of Toronto showing Local Immigration Partnerships and Welcome-ability Ranks



As could be seen in Figure 5 and in reference to Table 3, York Region with the nearby North York East in Toronto, Peel Region with the adjacent North Etobicoke of Toronto, and Durham to the East of Toronto are the 5 most welcoming communities. In general, welcome-ability of Ontario LIPs seems to radiate from these core places. Among the next ten in rank, for example, are areas adjacent Peel in the west, namely, Halton, Hamilton, Guelph-Wellington, and Waterloo; and Simcoe County that is adjacent to York. The exceptions are Windsor and Ottawa, with ranks that are quite high – 9th and 11th, though located in the opposite ends of South Ontario.

This “radiating” pattern continues in Western Ontario, with Grand Erie, Niagara, Sarnia-Lambton, and London-Middlesex, being closer in rank to the earlier named communities. The exceptions to this are St. Thomas-Elgin and Huron County that are among the last 10 in rank – 36th and 43rd respectively; the former’s rank is pulled by its low rank in the social domain; and the latter by its low in all the three domains.

Eastern Ontario, Peterborough and Quinte, which are both nearer to Toronto, are lower in rank than Kingston and Renfrew and Lanark. And, unlike Toronto, Ottawa does not seem to have a radiating effect on the adjacent communities of Smith Falls (39th), Five Eastern Counties (33rd), and Leeds and Grenville (35th) as all have lower welcome-ability ranking.

Communities in Northern Ontario are, in general, in the lower third of the overall ranking – Northwestern Ontario is 38th, Sault Ste Marie 41st, and Timmins 44th, mainly due to their low ranks in the social domain. North Bay at 25th is in the mid rank, with Greater Sudbury (30th) and Thunder Bay (31st) not too far behind.

There does not seem to be a clear geographic pattern of welcome-ability in Toronto (Figure 5), except for the observation that the downtown areas (East and West) and the areas to its north (Lawrence Heights and Bathurst-Finch) seem to be the least welcoming. These communities rank high in the social and health domains but have low ranks in the economic domain, a contrast to the northern Ontario communities.

While we have discussed the rankings of these communities, a caveat is in order. These ranks are mainly based on data that are available to us; and these data are only rough approximations of the “realities” that we aimed to measure, which are the opportunities and conditions in each domain. A limitation that is most apparent is the lack of data on the political domain, especially in the participation and engagement in organization in the communities. Sophisticated statistical techniques of analysis are only as good as the data that are analyzed.

4. Integration Index: An Illustration Using Individual-Level Data

4a. Data and Methods

The Canadian General Social Survey on Social Networks conducted by Statistics Canada in 2008 provides an opportunity to examine and measure integration’s multi-dimensional nature as it gathered information on social networks, civic participation, and individual characteristics and background. In particular, information was collected on labour force participation and personal income (economic dimension), voting behaviour and participation in organizations (political), and levels of trust in people, and sense of belonging (socio-cultural).

The target population included all Canadians 15 years and older excluding residents of Yukon, Northwest Territories, and Nunavut, and full-time residents of institutions. There were 20,401 respondents to the survey. In this paper, our analysis focused on residents of Ontario aged 30-64, a total of 4978 respondents.

The indicators we use for the dimensions are categorical variables; that is, the variable takes on the value “1”, if the respondent possesses the condition below, otherwise, the variable takes on the value “0”:

- Paid work: Work at paid job or business. (Derived from variable: ACMYR)
- Income: Annual personal income is \$15,000 and over for residents in Rural and Small Towns (non-CMA/CA) and Prince Edward Island, or \$20,000 and over for residents in Larger Urban Centres (CMA/CA)⁶. (Derived from variable: INCM)
- Trust: Feel that people can be trusted. (Derived from variable: TRT_Q110)

⁶ We considered the use of household income for this variable. However, a high proportion of respondents (about 15%) did not provide income information, and we decided to impute the missing values from other information provided in the survey. As the survey had more information about individuals (for example, education) than about households, we opted to use personal income.

- Belonging: Feel a very strong sense of belonging to local community, province, or Canada. (Derived from variables: DOR_Q635, DOR_Q636, and DOR_Q637)
- Voting in election: Voted in last federal, provincial, or municipal election. (Derived from variables: PER_Q110; PER_Q120; PER_Q130)
- Membership in organization: Participated in or a member of at least one group. (Derived from variable: CER_Q150)

To obtain an integration score for each individual, we assign weights to each of the dimensions. We follow a similar procedure used for the Welcome-ability index above; that is, we assign a weight of 50% for the economic domain, and 25% each for the social and political domain. Furthermore, we assume that the “substantial” dimensions carry a heavier weight than the “formal” dimensions; that is, in each domain, we assign 40% for the formal and 60% for the substantial. (See Figure 3 for the assigned weights). Given this procedure, while each dimension takes on the value of “0” or “1”, the overall integration score for each individual takes on a scalar value that ranges between 0 and 1, inclusive⁷.

4b. Results

Table 4 shows for immigrants and non-immigrants the proportion who are gainfully employed and earned a personal income greater than the cut-off (indicators of economic dimensions of integration), feel that people can be trusted and a strong sense of belonging (social dimensions), and who voted and participated in organizations (political dimension). It also shows the mean integration score based on application of weights for each of the dimension for immigrants and non-immigrants by gender, ethnicity and urban/rural area of residence.

Unsurprisingly, immigrants are less integrated than non-immigrants, with an average integration score of 0.70 as against 0.76 (see Total rows in Table 4). Of the three domains, political is where immigrants are least integrated; in comparison to non-immigrants, immigrants are less likely to have voted (0.70 vs. 0.87) and to have participated in organizations (0.60 vs. 0.73). Immigrants are also less socially integrated, exhibiting lower scores in both trust in people and sense of belonging. The economic domain shows a contrasting difference: whereas immigrants are slightly more *integrated* through having paid work, their income is lower than that of non-immigrants.

⁷ Unlike the procedure for the welcome-ability index, for the integration index, it was not necessary to do any conversion as all indicators are measured in the same way; that is, each took on just two possible values of “0” or “1”. Had the values been different for the indicators, a similar procedure as those outlined for welcome-ability could be used. For example, factor analysis (exploratory and confirmatory) could also be done, and conversion procedures followed, this time with individuals as units of analysis. Assignment of scores as was done by Pastor *et al*, or use of *location quotients* are also possible (see footnote #5).

Table 4: Average Scores on the Economic, Social and Political dimensions and on the overall Integration Index by Immigration Status and by Gender, Ethnicity, and Urban/Rural Area of Residence Ontarians Aged 30-64, 2008 General Social Survey on Social Networks

Independent Variables	N	Economic		Socio-Cultural		Political		Integration Index
		Work at Paid Job	Personal Income	Can Trust People	Strong Sense of Belonging	Voted in Election	Participate in Org.	
Immigrants								
Gender								
Male	713	0.89	0.89	0.49	0.67	0.68	0.65	0.76
Female	704	0.63	0.69	0.44	0.66	0.73	0.56	0.64
Ethnicity								
Visible Minority	788	0.75	0.76	0.44	0.68	0.67	0.56	0.68
Non-Visible Minority	589	0.77	0.82	0.51	0.66	0.74	0.67	0.72
Urban/Rural								
Larger Urban Centres (CMA/CA)	1364	0.76	0.80	0.46	0.66	0.71	0.60	0.70
Rural and Small Towns (non-CMA/CA)	53	0.75	0.66	0.62	0.74	0.70	0.74	0.70
Total	1417	0.76	0.79	0.47	0.67	0.70	0.60	0.70
Non-Immigrants								
Gender								
Male	1729	0.83	0.93	0.54	0.70	0.87	0.74	0.80
Female	1785	0.65	0.75	0.55	0.73	0.87	0.72	0.71
Ethnicity								
Visible Minority	63	0.72	0.89	0.42	0.65	0.78	0.73	0.73
Non-Visible Minority	3367	0.74	0.83	0.54	0.72	0.87	0.73	0.76
Urban/Rural								
Larger Urban Centres (CMA/CA)	2907	0.74	0.84	0.54	0.72	0.88	0.73	0.76
Rural and Small Towns (non-CMA/CA)	607	0.72	0.81	0.54	0.71	0.81	0.72	0.74
Total	3514	0.74	0.84	0.54	0.72	0.87	0.73	0.76

Women are less integrated than men, both among immigrants and non-immigrants, with the biggest differences in the economic dimensions. The gender difference in integration is greater among immigrants than among non-immigrants – the difference in the former is 0.12, whereas it is only 0.09 in the latter. Interestingly, a greater proportion of women than men immigrants have voted in the elections preceding the survey.

The proportion of visible minorities is much higher among the immigrants (57%) than among non-immigrants (2%). And, visible minorities whether immigrants or non-immigrants, are less integrated than non-visible minorities. Note however that non-immigrant visible minorities have almost the same integration score (0.73) as the immigrant non-visible minorities (0.72).

Had the survey provided identifiers for the Ontario CMA/CAs and non-CMA/CAs, we would have been able to obtain mean integration scores for the smaller geographic configurations used in the analysis for welcome-ability. As there were no detailed geographic identifiers in the micro-data file available to us, the most that we could do is to obtain mean integration scores for Urban and Rural areas. Interestingly, immigrants are as integrated in urban as they are in rural areas, largely due to their stronger social and political integration, which counters their weaker economic integration. For non-immigrants, the average integration score is slightly lower in the rural than in the urban areas.

While we have shown that the use of the integration index (or score) can be useful to describe levels of integration by population sub-groups or by area of residence, the integration score for each individual by itself can be useful to do further analysis. For example, it can be used as a dependent variable in a multivariate analysis to examine the influences on integration of various characteristics or traits such as religion or religiosity and education. It could also be used as an independent or explanatory variable in a multi-level analysis, as described in the next section

5. Concluding Remarks: Toward Multi-Level Analysis of Integration

In reference to arrow 1 in Figure 1, we have illustrated that community characteristics or conditions (in economic/health and social domains) could be used to measure the ability of communities to welcome immigrants; that is, the community welcome-ability index. And, arrow 2 is illustrated by using information in the economic, social and political domains from survey of individuals to measure their integration levels. Had there been sufficient number of respondents and there was information from the survey on respondents' area of residence similar to the Census Divisions, Census Subdivision, Census Tracts and Dissemination areas used in the community-level analysis, we would have attempted to examine the influence of the community characteristics or conditions on the immigrants through multi-level techniques of analysis; that is, arrow 3 in Figure 1. This would be the type of analysis that could examine whether initiatives such as Local Immigration Partnerships and settlement services offered by communities are the "bridges" that connect the various opportunities in the communities (macro) to the newcomers (micro). This arrow would represent studies that examine the "interaction of stakeholders", as seen for example, in the framework for analysis of immigrant integration proposed by Biles, Burstein and Frideres (2008:272).

Thus, a comprehensive macro-micro analysis of the integration of immigrants, including the influence of opportunities and constraints and of policies and services, would require information on communities, on individuals, and on initiatives for immigrants. The welcoming communities project that the authors were involved in, gathered data from various sources (census, a population health survey, and sources provided through the internet), which data were mainly proxies for opportunities available in the community. While these data are not perfect, they could nevertheless be useful in attempts to develop measures of the capacity of communities to welcome newcomers (as illustrated above).

With appropriate questions, a survey is an effective way of gathering information at the individual level provided that the numbers of respondents in the communities are large enough to allow robust estimation of indicators. A survey could gather comprehensive information on economic, social, cultural, and political dimensions as suggested by Biles, Burstein, and Frideres (2008:275), although as shown in our illustration above, even limited but varied numbers of questions could be useful. Regardless of the extent of questions asked, for purposes of comparison (and for a reason described below), the respondents should include both immigrants and non-immigrants, and the interaction or networking that happens between them. Furthermore, if there is interest in examining the effect of services for immigrants, questions regarding such services should also be included in the survey, with additional information on services gathered from other sources including agencies providing the services.

Immigration is seen, and often justified, as making contribution to the receiving society. Thus, Integration of immigrants has to be seen in the context of a broader societal goal, such as social cohesion. The framework of analysis presented in Figure 1 could be expanded such that the inter-

relations of conditions and outcomes bring into the picture not only immigrants but also non-immigrants.

Figure 7: Theoretical Macro-Micro Framework of Analysis of Social Cohesion

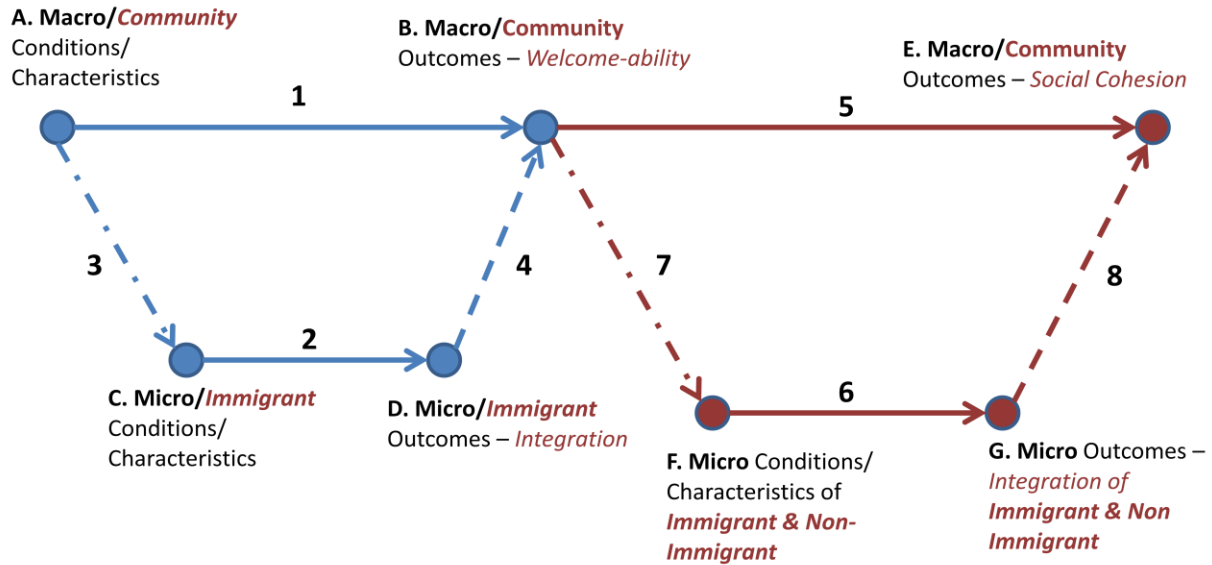


Figure 7 builds on Figure 1, with “welcome-ability”, a macro-level outcome, now considered as a community condition or characteristic that contributes to “social cohesion”, a macro-level outcome (arrow 5). The micro-level conditions or characteristics leading to micro-level outcomes now include both immigrants and non-immigrants (arrow 6). The “bridge” (arrow 7) represents the assumption that welcome-ability benefits not only newcomers but also the settled individuals in the communities. Finally, arrow 8 indicates that the integration of immigrants and non-immigrants, a micro-level outcome, contributes to social cohesion, a macro-level outcome. This micro to macro relation, referred to by Raub, Buskens and van Assen (2011) as a “transformation rule”, could be a social network process. That is, one could hypothesize that immigrants and non-immigrants who are well integrated in the society are also more likely to be engaged in networking with each other, which in turn contributes to a community’s social cohesion.

An empirical study that tests all the relationships posited in Figure 7 would be comprehensive and huge, and may not be possible with the data currently available to us. Nevertheless, the framework is useful in that it could locate within one schema, the various studies that may be possible to do with the available data. The schema is also useful when planning for data collection. A survey, for example, with only immigrants as respondents would not be as useful as when non-immigrants are also asked the same questions. This is particularly true for questions related to the dimensions of integration; that is, while most definitions of integration focus mainly on immigrants, non-immigrants’ integration could as well vary with their conditions and characteristics (as shown in the analysis of integration above). The schema also points to the importance in deriving measures (or indices) of latent characteristics such as welcome-ability and integration that could be used for further analysis as explanatory or outcome variables shown in the framework.

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APPENDIX

Appendix Table 1: Descriptive Statistics of Latent scores, obtained from SEM for the three domains – Economic, Social and Health - and of their ranks and exponentials of ranks

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Economic	45	-3.000	2.323	0.00000	1.000000	-0.546	0.354	2.246	0.695
Social	45	-1.298	1.878	0.00000	1.000000	0.492	0.354	-1.188	0.695
Health	45	-1.483	1.642	0.00000	1.000000	0.064	0.354	-1.327	0.695
Rank of Economic	45	1.000	45.000	23.00000	13.133926	0.000	0.354	-1.200	0.695
Rank of Social	45	1.000	45.000	23.00000	13.133926	0.000	0.354	-1.200	0.695
Rank of Health	45	1.000	45.000	23.00000	13.133926	0.000	0.354	-1.200	0.695
NREconomic	45	0.02	1.00	0.5111	0.29187	0.000	0.354	-1.200	0.695
NRSocial	45	0.02	1.00	0.5111	0.29187	0.000	0.354	-1.200	0.695
NRHealth	45	0.02	1.00	0.5111	0.29187	0.000	0.354	-1.200	0.695
TREconomic	45	0.58	90.00	20.8770	20.34725	1.635	0.354	2.712	0.695
TRSocial	45	0.58	90.00	20.8770	20.34725	1.635	0.354	2.712	0.695
TRHealth	45	0.58	90.00	20.8770	20.34725	1.635	0.354	2.712	0.695
Overall Index of Welcome-ability	45	2.69	48.66	20.8770	11.73467	0.307	0.354	-0.490	0.695

Exponential Transformation of Latent Scores

An exponential transformation is done as follows:

- a) First, we find the ranks of the latent scores for each domain. These ranks (R) range from 1 to N (sample size), 1 standing for the most welcoming community in that domain (corresponding to the highest positive latent score) and N the least welcoming. [Note that the “least welcoming” does not mean absence of welcome-ability.] These ranks can be rescaled to the range of (0, 1) by computing $NR = R/N$.
- b) To transform these NR values into a common (exponential) distribution, we use the following procedure. For example, for the Economic Domain:

$$TREconomic = -20 * \ln[(1 - NR) * (1 - \exp(-100/20))]$$

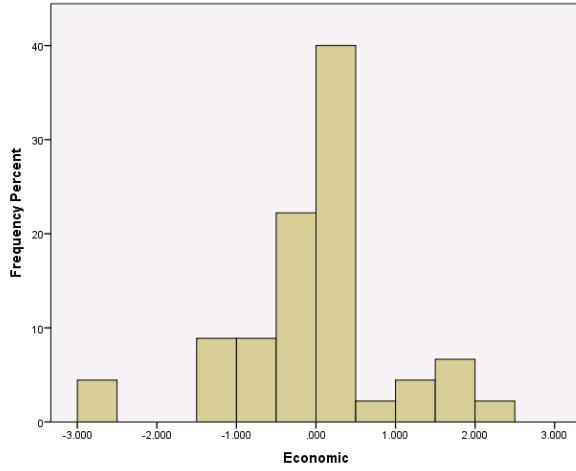
The value 20 stands for the mean of the exponential distribution. Trial and error will suggest the best value that gives a good exponential shape. These transformed values – let us call them exponentials of ranks - range from 0 to 100, zero standing for the most welcoming and 100 the least welcoming. This transformation results in a proper distribution that is common to all domains, with means around 20, standard deviations also around 20, skewness around 1.6 and kurtosis around 2.7 – see Appendix Table 1. [It is good to recall that the theoretical exponential distribution has a skewness of 2 and a kurtosis of 9 (see Krishnamoorthy, 2006). In this exercise, we get some difference in kurtosis measures because we have used a common mean value of 20 for all distributions. More specific refinements will follow theoretical values, but practically such a procedure is not essential.] A more important point is that the skewness and kurtosis measures are such that they *reduce* any “cancellation effect” that will occur when high scores in one domain are combined with low scores in another.

Finally, the exponentials of ranks for each domain are combined to give an overall index of welcome-ability. Theoretically, a combination of three exponentially distributed scores follows a gamma distribution. Thus, the distribution of the overall index of welcome-ability follows a gamma distribution; this information would be useful while working further with the combined scores of welcome-ability in statistical models.

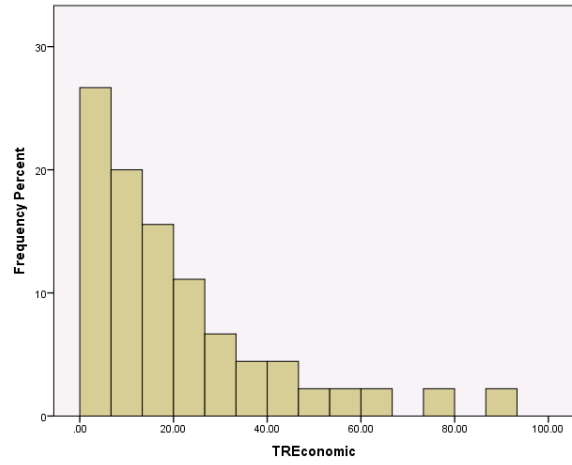
A practical problem at this stage is to decide on appropriate weights to use to combine the domain scores. We use weights of 50% for the Economic, and 25% each for the Social and Health Domains as explained in the text.

Appendix Figure 1: Distributions of original latent scores and the exponentially transformed scores of the Economic domain and distribution of the overall index of welcome-ability

a) Original latent scores



b) Exponentially transformed scores



c) Overall index of welcome-ability

