Appendix

For interested readers, we provide a more detailed description of our quantitative model here. We build on recently published research to quantify the gains from easing migration costs. In particular, we use a model along the lines of those developed by Tombe and Zhu (2018) and Tombe and Winter (2020), the latter being an investigation of internal trade and fiscal transfers in Canada. This model was also recently used in Alvarez et al. (2019), an IMF Working Paper quantifying the effect of internal trade costs on economic activity and migration in Canada. Distinct from these papers, we do not estimate the implications of changing trade costs but instead focus on changing migration costs. Importantly, this model does not explicitly consider capital or investment, meaning that value-added is seen as a composite of labour and capital. Hence, our results should be considered longer-run implications of migration cost reductions.

In order to model migration, we suppose that workers decide where to live on the basis of maximizing their individual well-being. This depends on relative earnings, cost of living and location preferences. Workers differ in these preferences, even though they may face common wages and prices when making decisions over where to live and work. Given individual preferences, some workers will choose to live in a particular province, almost regardless of how low earnings are there or how high the cost of living. But, at the margin, changes in either earnings or living costs will affect where at least some workers choose to live, regardless of any initial difference that may exist initially between a potential migrant's source and destination province.

In addition, we consider migration costs as a friction that leads workers to live in a location that they would have otherwise not have chosen. They might want to move to take advantage of higher earnings or lower costs of living elsewhere, but they choose not to because the marginal gains are insufficient to cover the migration costs. These costs can take many forms, from the time and hassle involved in certifying their credentials to transaction costs involved in selling and buying real estate, losing connections to friends and family, actual moving costs and so on.

Mathematically, we can represent all these considerations in a compact and tractable form. Suppose individuals decide where to live and work based on earnings in the destination (w_n), the cost of living (p_n) and various other factors that depend on where an individual is moving from and where they are moving to (μ_{ni}). Each of these factors affects migration flows according to how sensitive people are to such differences in earnings, prices, amenities and other factors. This sensitivity is summarized as an elasticity of migration parameter k. It is governed by how individuals differ in their location preferences. If people are very different, there will be fewer individuals willing to move in response to marginal changes in wages, living or migration costs. And under certain assumptions, which we will not discuss here, we can explicitly solve for the share of individuals from province n that will choose to move to province i. In particular,

$$m_{ni} = \frac{(w_i/\mu_{ni}p_i)^\kappa}{\sum_{j=1}^{N}\left(w_j/\mu_{nj}p_j\right)^\kappa},$$

where m_{ni} is the fraction of individuals who are from province n that will choose to move to province i. The total number of people in province i is therefore $\sum_n \bar{L}_n m_{ni}$, where $\bar{L}_n$ is the initial distribution of workers across locations.

This model allows us to represent migration shifts that result from changes in wages, prices and migration costs. To that end, denoting relative changes in any given variable as $\hat{x} \equiv x'/x$, , we can write

$$\hat{m}_{ni} = \frac{(\hat{w}_i/\hat{\mu}_{ni}\hat{p}_i)^\kappa}{\sum_{j=1}^{N} m_{nj}\left(\hat{w}_j/\hat{\mu}_{nj}\hat{p}_j\right)^\kappa},$$

where the distribution of migration observed in the data is summarized by m_{ni} in the denominator of the above expression. In the quantitative analysis to come, we use census data to determine the appropriate values for m_{ni}.

At this point, some intuition may be helpful. Consider first the direct effect of lower migration costs. That is, abstract for a moment how changes in migration affect wages, prices, trade flows and so on. The above expression implies

$$\hat{m}_{ni} \propto (\hat{\mu}_{ni})^{-\kappa},$$

which reveals that the effect of migration costs on migration flows is principally governed by the elasticity of migration k. If the migration elasticity with respect to real income is 1.5, which is in line with some empirical estimates both in Canada and other countries,[15] then a 1 percent reduction in migration costs μ_{ni} will increase the number of migrants by roughly 1.5 percent. The impact will not be exactly 1.5 percent since there are offsetting effects of the change on wages and on the cost of living, both in the origin and the destination region. More workers moving into a province will, for example, also affect wages, prices, trade-flows and other economic outcomes. But abstracting from these offsetting factors for now, how many workers would a 1.5 percent increase in the number of interprovincial migrants to Alberta represent? Based on the census's five-year migration volume, this would represent nearly 3,500 more interprovincial migrants.

However, changes in migration will also have implications for wages and prices. More workers in a particular region may lower wages and prices and will, therefore, affect trade flows as regions elsewhere source from producers within the region experiencing inflows. This is more difficult to explicitly solve for, but important to keep in mind when interpreting the results to come.

How migration affects the broader provincial economy can also be captured by our model in a tractable way. If there were no trade and all output was produced using only labour according to a simple and linear production technology $Y_i = A_i L_i$, then each additional worker would increase total output in province i by A_i. That is, each migrant increases GDP by the marginal product of labour. In Alberta, nominal labour productivity measured as GDP per worker is nearly \$150,000 per year. Therefore, a simple estimate of the GDP gains from migration would be \$150,000 per year per migrant. But this is an overestimate. In a model that includes trade flows, such as the one we use here, there are some diminishing returns. More workers will increase the variety of goods and services produced, and slightly lower productivity producers will begin to operate at the margin. This will consequently lower the average per-worker productivity somewhat and partially (but not fully) offset some of the gains from migration.

To illustrate this point more precisely, in a one-sector trade model without any trade costs at all, one can show that $\hat{Y}_i \propto \hat{L}_i^{\theta/(1+\theta)}$, where θ demonstrates how sensitive trade flows are to costs.[16] In this simple one-sector model, a 1 percent increase in the number of workers in a region will increase GDP by 0.8 percent (based on $\theta = 4$, which is a reasonable estimate of trade elasticity).[17] With this intuition in mind, we turn to Alberta's potential gains from migration under various scenarios.

15 See, for example, Helliwell (1996) for estimates of the real per capita GDP elasticity of interprovincial migration in Canada or Tombe and Zhu (2019) for estimates of the same for China. Fajgelbaum et al. (2019) estimate a slightly lower elasticity of 1.39 for interstate migration in the United States.

16 Specifically, this is an implication of the workhorse Eaton and Kortum (2002) trade model.

17 In our full model, we use sector-specific elasticities derived from Caliendo and Parro (2015), who estimate this parameter for Canada, the United States, and Mexico. The overall average is 4.55 across all sectors.

With this model in hand, we can estimate gains from lower migration costs by simulating its equilibrium response to changes in underlying model parameters. Specifically, we simulate the model based on various changes in $\hat{\mu}_{ni}$ .For example, if the migration costs of moving into Alberta increases workers' effective real income by, say, 1 percent relative to what it would otherwise be, then $\hat{\mu}_{ni}$ = 0.99. We estimate GDP gains of more than $250 million as a result and that nearly 1,800 additional workers would migrate to Alberta from other provinces. Similarly, if migration costs decline by an amount equivalent to 1 percent of real income, then $\frac{1}{\mu'_{ni}} = \frac{1}{\mu_{ni}} + 0.01$. These are two simple examples, but the model is flexible enough to handle a wide variety of changes to migration costs, since ultimately $\hat{\mu}_{ni}$ is exogenous. As our goal is not to estimate migration costs or the effect of a specific policy, we proceed in two ways. First, we report the gains from lower migration costs over a range of illustrative values. Second, we report the gains from lower migration costs per potential migrant.