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Access Denied: The Effect of Apprenticeship Restrictions in Skilled Trades

Encouraging more workers to enter the skilled trades has become a national policy priority. However, provincial regulations that limit how many apprentices a firm can hire are restricting workers from entering the trades of their choice.

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THE STUDY IN BRIEF

Skilled trades workers – ranging from electricians to carpenters to welders – are a crucial component of the Canadian labour force. However, many employers report that there are shortages of skilled workers in these occupations.

Federal and provincial governments have targeted many grant and tax credit programs to encourage workers to become apprentices in the skilled trades. However, myriad provincial regulations that limit how many apprentices firms may hire are stymieing these efforts and limiting apprenticeship opportunities.

Provinces regulate whether workers must complete a certified apprenticeship in order to legally work in an occupation, as well as the length of apprenticeship terms. This *Commentary* finds that strict provincial regulations on the rate at which firms may hire apprentices, which is relative to the number of certified workers they employ, reduce the number of people who work in a trade.

Furthermore, the trades in provinces with the strictest regulations on hiring have lower levels of young workers while workers who manage to find work in these trades have higher incomes, suggesting that these regulations are acting as barriers to entry.

Governments have set these regulations in order to protect workers and the general public by encouraging workers to gain the proper training in skilled trades. However, entry restrictions are not the best means by which to regulate the quality and safety of work for all trades. Instead of regulating the rate of apprentice entry, governments should focus on regulating the quality of work and safety standards when appropriate. In other words, instead of regulating inputs governments should shift the focus of trades' regulation to outputs.

With recent moves by the federal government to encourage workers to enter the trades, it is now up to the provinces to eliminate antiquated and harmful regulations on apprenticeship.

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Workers in the skilled trades – carpenters, plumbers, electricians, and many more occupations – are a crucial component of the Canadian labour force.

According to the 2006 census, 2.1 million Canadians worked in a trade for some period in 2005, while 1.2 million of them worked full time for the entire year, comprising 13 percent of the country's full-time workers. Canadian employers, however, report difficulty in finding enough sufficiently skilled workers to fill vacant trades positions; in 2009, 24 percent said they could not do so (Desjardins 2010).¹ Since the existing skilled trades workforce is older than the workforce as a whole,² shortages will worsen if new workers do not replace those soon to retire.

Male workers in the trades have higher incomes than people with only a high-school degree (see, for example, Boothby and Drewes 2010), which should have encouraged more individuals to pursue work in the trades. Yet the apparent shortage persists, for reasons such as negative perceptions of the trades, interprovincial barriers to mobility (Conference Board of Canada 2002), and low apprenticeship program completion rates (Coe 2011; Laporte and Mueller 2010, 2012). Another significant reason, which we highlight in this *Commentary*, is the pernicious effect of provincial regulations.

Under Canada's Constitution, the provinces have the exclusive power to regulate apprentice programs and entry into the trades, and they have done so on the grounds that the unregulated entry of inadequately trained workers might endanger the public. Some provinces require would-be entrants to certain trades to undertake an apprenticeship program and obtain formal certification. Many provinces also regulate the rate at which firms in specific trades may hire apprentices relative to the number of certified workers – known as journeypersons – they already employ.

We find that the strictest provincial apprenticeship restrictions substantially reduce the number of people working in a trade: provinces that impose tight restrictions have 44 percent fewer workers in those trades than provinces that have no restrictions. As well, in provinces that require a firm to have more than one journeyperson for every apprentice it hires, there are relatively fewer young workers in the trades. This relative shortage of new entrants correlates with higher wages for those who are fortunate to find work in the trades.

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- 1 Analysts disagree about the severity of Canada's skilled labour shortage; see, for example, Lefebvre, Simonova, and Wang (2012). Our analysis holds, however, independent of whether or not there is such a shortage in general, since we focus on the number of people working in specific trades relative to workers in other trades.
- 2 According to the 2006 census, in the workforce as a whole (excluding trades), 39.3 percent of workers were over age 45; in contrast, 42.1 percent of workers in trades, transportation, and equipment operating were over age 45. The demographic bulge is worst among machinery and transportation equipment mechanics (46.2 percent older than 45), heavy equipment and crane operators (48.0 percent older than 45), and industrial electricians (52.3 percent older than 45).

The Opportunity for Reform

Many Canadian governments place a high priority on encouraging more workers into the trades. The federal government has introduced a number of tax credits, employment insurance (EI) programs, and grants to encourage people, especially younger workers, to enter the trades and to reduce firms' cost of hiring apprentices (see Box 1). Among the provinces, Ontario, for example, provides a credit of between 35 and 45 percent of the cost of hiring an apprentice, up to a maximum of \$10,000. Yet these efforts are undone by the lack of reform of labour market institutions that restrict potential new entrants and reduce the ability of firms to offer employment. Some provinces have taken steps toward reform. Ontario, which has the largest number of workers in the skilled trades, is in the midst of significantly changing its labour market institutions for trades. Alberta reduced its journeyman-apprentice ratio in a number of trades in 2011 (Gilbert 2011), and Newfoundland and Labrador did so in a number of construction trades in mid-2012.³

Our fundamental recommendation is that, if provinces want more workers in the trades, they should allow firms to hire more apprentices. Loosening restrictions on entry would not necessarily mean eliminating regulations. Instead, we recommend shifting the focus of regulation to the quality of work that tradespeople do. After all, the rationale for government intervention in this sector in the first place is to ensure public safety

and assure the quality of goods and services consumers purchase. Moreover, unlike tax credits, EI, and grants, regulatory reform would not have a fiscal cost.

APPRENTICESHIP IN CANADA

Apprenticeship has been a key component of training in skilled trades for centuries. In these trades, experienced workers take on students and teach them practical knowledge while providing some payment during the training period. Traditionally, an apprentice was bound to serve the journeyman for a prescribed period, after which the apprentice would become a journeyman and could practise on his or her own.

All provinces and territories have an apprentice accreditation system of some kind that applies to a wide range of occupations, including electricians, plumbers, carpenters, and many more (see Table 1). In 2010, approximately 430,000 Canadians were registered for apprenticeships, and more than 35,000 completed them, a substantial increase since 2001 (see Figure 1).⁴ Annual apprentice completions, however, still account for less than 2 percent of the overall trade workforce. Apprenticeships are not the only means by which people can earn a trade qualification. Those with the requisite skills can write a trade-qualifying exam.⁵ This route has been particularly common in the construction and electrical trades, which have the highest rates of exam-taking over apprenticeships

3 For details of these reforms, see "More apprentices allowed per journeyman," *Telegram* (St. John's, NF), July 19, 2012; available online at <http://www.thetelegram.com/News/Local/2012-07-19/article-3034597/More-apprentices-allowed-per-journeyman-1>.

4 Most of the 430,000 registered apprentices were enrolled in multi-year programs and not scheduled to complete their training in 2010.

5 Further, many journeymen will have been grandfathered into an accreditation system upon its introduction by virtue of having worked in the area, despite not undergoing formal training.

Box 1: Federal Support for Apprentices and Skilled Trades Workers

The federal government supports apprentices and trades workers financially through a number of programs, such as the Apprenticeship Incentive Grant, the Apprenticeship Completion Grant, the Apprenticeship Job Creation Tax Credit, and the Tradesperson's Tools Deduction. Ottawa estimates – based on the Public Accounts for fiscal year 2011/12 and tax expenditure projections for 2011 – that these and other grants and tax expenditures targeted to trades amount to approximately \$185 million per year (Canada 2012d, 2013a). Apprentices are eligible for direct EI benefits during the classroom portion of their training, which amounted to \$172 million in fiscal year 2010/11. In addition, Ottawa funds provincially administered skills development programs as part of the Labour Market Development Agreements. This funding supported the training of 64,057 apprentices, representing approximately 40 percent of total claimants of the \$1.25 billion overall skills development program in 2010/11 (Canada 2012c). Policies announced in the March 2013 federal budget will provide additional support, such as through federal procurement rules, for firms that hire apprentices. The budget also announced a small amount of funding to assist provinces to “increase opportunities for apprentices” and plans to “[reduce] barriers to apprenticeship accreditation, including examining the use of practical tests as a method of assessment for apprentices (Canada 2013b).”

(Desjardins 2010). However, the number pursuing this route in the trades has been relatively flat over the past 10 years and is now less than half the number of people who complete an apprenticeship.

The Interprovincial Red Seal Program

In 1959, the federal and provincial governments founded the Interprovincial Standards Red Seal Program to encourage “harmonization of provincial and territorial apprenticeship training and certification programs by developing and maintaining interprovincial standards of qualification for Red Seal trades, in partnership with apprenticeship and certification stakeholders” (Canada 2012a). A Red Seal certification means that, in addition to having obtained a provincial certification, the apprentice has passed an interprovincial standardized exam that gives prospective employers in other provinces greater

certainty that the skilled worker does not require additional training. Workers need a Red Seal certification to be able to work in their trade in all provinces that are party to the Red Seal program for that trade. About 60 percent of those who complete a provincial apprentice certification also obtain a Red Seal certification (Desjardins 2010).

Currently, among the hundreds of trades covered by varying degrees of provincial regulation, 55 are covered by the Red Seal program. Approximately 81 percent of registered apprentices were in the program in fiscal year 2009/10 (Canada 2012c). The Red Seal program and interprovincial agreements such as the New West Partnership – formerly known as the Trade, Investment, and Labour Mobility Agreement – have enabled certified trade workers to pursue work in equivalent trades in all participating provinces (see Knox 2010).

According to the 2006 census, about 1.6 million people worked for some period in 2005 in Red

Table 1: Apprenticeship Regulations by Occupation, 2012

Occupation	Have Apprentice Training ^a	Worked in 2005 ^a	Compulsory Certification	Apprenticeship Term		Primary Journeyperson: Apprentice Ratio		Higher Secondary Ratio?
				Minimum	Maximum	Minimum	Maximum	
	<i>(thousands)</i>		<i>(% of provinces)</i>	<i>(hours)</i>				
Boilermakers	2.1	4.1	30	4,500	8,000	1:2	5:1	yes
Bricklayers	7.5	19.6	30	4,800	7,200	1:2	5:1	yes
Cabinetmakers	6.9	25.2	0	5,440	8,000	1:2	1:1	
Carpenters	52.7	163.3	10	3,844	8,000	1:2	5:1	yes
Construction millwrights and industrial mechanics (except textile)	34.7	78.9	10	6,000	8,000	1:2	5:1	
Cooks	26.0	215.1	0	2,700	6,000	1:2	1:1	
Electricians (except industrial and power system)	39.2	75.4	90	5,850	9,000	1:2	2:1	yes
Glaziers	2.9	10.7	10	6,000	8,000	1:3	3:1	yes
Hairstylists and barbers	63.7	95.7	50	2,800	6,000	1:3	1:1	
Machinists and machining and tooling inspectors	21.5	54.1	0	6,240	8,000	1:3	1:1	
Painters and decorators	10.4	53.3	10	3,900	6,000	1:2	5:1	yes
Plasterers, drywall installers, and finishers and lathers	8.7	34.9	10	4,500	7,200	1:2	5:1	yes
Plumbers	24.1	46.2	70	5,620	9,000	1:2	2:1	yes
Refrigeration and air conditioning mechanics	10.3	22.7	70	6,000	9,000	1:2	2:1	
Roofers and shinglers	4.8	22.9	10	2,000	5,860	1:3	4:1	yes
Sheet metal workers	10.2	22.1	40	5,680	9,000	1:2	2:1	yes
Structural metal and platework fabricators and fitters	3.7	12.1	0	4,500	8,000	1:5	1:1	
Welders and related machine operators	50.4	105.6	10	1,620	6,000	1:3	1:1	
All other Red Seal trades	184.1	520.4	8 ^b	1,680	9,000	1:3	5:1	
			National Total	National Median		National Median		
Total, all Red Seal occupations	583.1	1,622.5	16^b	6,000		1:1		
Non-Red Seal trades	127.9	541.1						

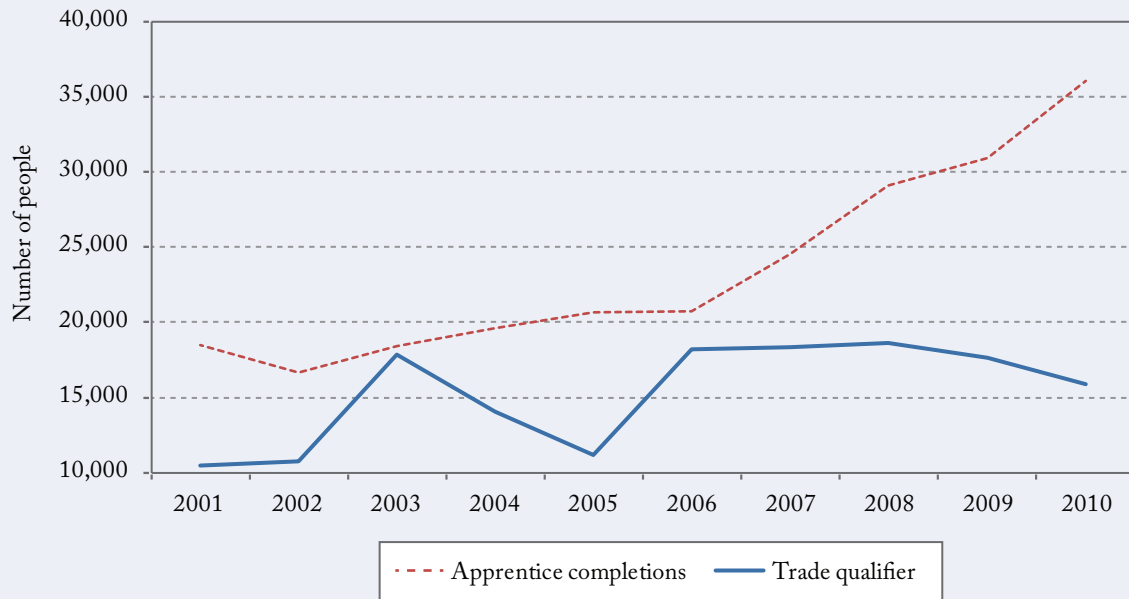
Note:

a As reported in 2006 census.

b Some provinces do not report whether certification is voluntary or compulsory in other Red Seal trades.

Sources: Authors' calculations from Human Resources and Skills Development Canada and Statistics Canada.

Figure 1: Apprenticeship Completions and Trade Qualifiers, Major Trades, 2001–10



Source: Authors' calculations from Statistics Canada.

Seal trades⁶ and a further 540,000 in non-Red Seal trades.⁷ The ratio of those who worked in Red Seal trades to the overall full-time workforce varies by province (see Table 2). The national average of Red Seal trades workers per thousand full-time workers was 175, but Alberta and Newfoundland and Labrador had more than 220 while Ontario, Quebec, and Manitoba had ratios below the national average.

Certification

All the provinces have a formal process by which occupations become subject to regulation and how the regulations are then set. Most provinces have a department or board within a ministry responsible for education, labour, or training that hears applications from industry and labour representatives. Ontario, for example, recently

6 We were unable to match data from the census perfectly with all occupation-specific apprenticeship rules; it may be that a significant number are in similar, but non-Red Seal, trades. See the Appendix for details on how we matched census data with provincial regulations.

7 Non-Red Seal trades may be subject to regulation, but the regulations might not be listed in the document popularly known as the Ellis Chart, after the Saskatchewan official who first organized provincial comparisons of apprenticeship regulations (see Canada 2012b).

Table 2: Apprenticeship Regulations by Province, 2012

Province	Red Seal Trades	Non-Red Seal Trades	Have Apprenticeship Training ^a	Worked in Red Seal Trade, 2005 ^a	Compulsory Certification	Provincial Median (Red Seal Trades Only)		
						Apprenticeship Term	Initial Journey-person-Apprentice Ratio	Secondary Journey-person-Apprentice Ratio
	<i>(thousands of workers)</i>		<i>(per thousand full-time workers)</i>		<i>(percent of occupations)</i>	<i>(Minimum hours)</i>		
Alberta	240.2	72.8	79	225	28	4,800	1:2	N/A
British Columbia	220.4	77.1	67	198	0	5,690	N/A	N/A
Manitoba	56.1	20.3	47	161	11	6,000	1:1	2:1
New Brunswick	41.2	12.1	63	207	14	7,200	1:1	N/A
Newfoundland & Labrador	28.7	7.9	88	257	3	6,300	1:2	N/A
Nova Scotia	46.5	13.8	61	182	19	8,000	1:1	N/A
Ontario	550.9	190.9	45	149	17	6,600	1:1	3:1
Prince Edward Island	7.4	2.0	55	205	8	8,000	1:1	3:1
Quebec	376.3	126.6	85	176	50	6,000	4.5:1	N/A
Saskatchewan	54.8	17.7	67	191	14	6,200	1:2	~3.5:1
National Total	1,622.5	541.1	63	175	16	6,000	1:1	

Note: a As reported in 2006 census.

Sources: Authors' calculations from Human Resources and Skills Development Canada and Statistics Canada.

introduced the Ontario College of Trades (OCT), an arm's-length, industry-driven body with a mission "[t]o lead the promotion, regulation and governance of skilled trades in Ontario" (Ontario College of Trades 2012b). Among the OCT's main tasks are to facilitate review panels to determine the appropriate journey-person-apprentice ratios,

the appropriate training programs, and whether certification should be voluntary or mandatory in regulated trades.⁸

Once a trade becomes subject to accreditation, the provincial body responsible must decide whether to make the accreditation mandatory or voluntary. The OCT, for example, takes a number of

8 This is similar to, although covering a much broader range of trades than, industry-specific self-regulatory bodies, such as those for teachers, accountants, and dental hygienists (Dijkema and Van Pelt 2011).

factors into consideration when deciding to make certification compulsory for a trade.⁹ Certification is mandatory in most provinces for some trades – such as electricians, plumbers, and refrigeration and air conditioning mechanics – but is required in only 16 percent of all 370 programs surveyed by Human Resources and Skills Development Canada (Canada 2012b). In Alberta and Quebec, in particular, a large share of regulated trades is subject to compulsory certification, while, in a relatively recent change, British Columbia does not require certification in any trade.

Journeyman-Apprentice Ratios

Provincial accreditation bodies may also define the number of apprentices that any journeyman, or group of journeymen as part of a firm, can take on at a time.¹⁰ The ratio may differ between the first apprentice a firm hires and any subsequent apprentices hired, and according to the size of the employer.¹¹ For example, boilermakers in Saskatchewan have a primary ratio of 1:1 and a secondary ratio of 5:1, meaning that an employer needs one journeyman to take on the firm's first apprentice, but must have five more journeymen for every apprentice hired thereafter. Welders in Saskatchewan, in contrast, have a ratio of 1:3, meaning that each journeyman may have as many

as three apprentices (Canada 2012b).¹² These ratios apply to the whole firm, rather than to a specific worksite, so that they might not represent the true working relationship between journeymen and apprentices. Ratios are thus likely to harm smaller businesses that do not have multiple certified journeymen. Ratios also reduce the incentive for a firm to grow: if the firm wished to hire additional apprentices, it would first have to hire more journeymen, thus increasing the effective cost of labour. According to the 2006 census, across all trades and provinces in 2005, approximately 225,000 people worked in trades with primary ratios above one; 460,000 in trades with ratios of one to one; 120,000 in trades with ratios below one, but above zero; 150,000 in trades with variable ratios; and 550,000 in trades without a ratio.

The average primary ratio varies somewhat across provinces, with relatively low ratios common in Alberta, Newfoundland and Labrador, and Saskatchewan, but high ones in Quebec. The highest secondary ratios of two or more journeymen for each apprentice prevail in Manitoba, Ontario, Prince Edward Island, and Saskatchewan. The extent to which these ratios are binding depends on the number of registered apprentices relative to journeymen in a given trade and province. Because there are no statistics on the number of certified journeymen in a

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- 9 Under Ontario Regulation 458/11, the OCT must take into account the scope of practice of the trade; the health and safety of apprentices, journeymen, and the public; the effect, if any, on the environment; the economic impact; the classification of similar trades in other jurisdictions; the supply and demand for journeymen in the trade and in the labour market generally; the attraction and retention of apprentices and journeymen in the trade; and the age attrition of apprentices and journeymen in the trade.
- 10 A few trades in some provinces have variable ratios, while in other provinces and other trades, ratios are not applicable.
- 11 In Ontario, for example, electrician contractors with up to two journeymen can have a one to one journeyman-apprentice ratio, but larger firms have a three-to-one ratio.
- 12 The exact rationales for the original ratios are often unclear. For example, Ontario began regulating journeyman-apprentice ratios in the 1970s, beginning with section 10(2) of Regulation 1055 of the *Trades Qualification and Apprenticeship Act*, which specified that, unless otherwise prescribed, regulated trades were to have primary ratios of one to one for the firm's first apprentice, with three-to-one ratios for subsequent apprentices (see Armstrong 2008, para. 87). Numerous trades subsequently sought modifications of these original ratios for various trade-specific reasons.

province – let alone at the firm level at which these regulations apply – we look at the number of registered apprentices in major trades compared with the full-time trades workforce. In 2005, there were 10 apprentices for every 10 full-time, full-year journeypersons in Newfoundland and Labrador, and seven apprentices for every 10 full-time journeypersons in Quebec. In other provinces, there were between two and five apprentices for every 10 full-time trades workers.¹³

Apprenticeship Terms

Most provincial apprenticeship programs specify a minimum amount of on-the-job experience – usually the number of hours of work, paired with some classroom time – before an apprentice earns his or her certification. The median length of accreditation programs that report a minimum apprenticeship term is about 6,000 hours of work – roughly three years of full-time work and class time. Among common Red Seal trades, this term ranges from a low of 1,620 hours in one province for welders to as high as 9,000 hours for apprentices seeking certification as electricians, plumbers, refrigeration and air conditioning mechanics, or sheet metal workers. The average experience required for certification across all Red Seal trades varies relatively little among provinces, with averages deviating by no more than 1,200 hours – or slightly more than six months of work – from the national average.

THE EFFECT OF APPRENTICESHIP REGULATIONS ON LABOUR MARKETS

Which regulations matter most for the labour market outcomes of people who seek work in the trades? As governments encourage people to enter the trades and firms to offer more positions, it is important that policymakers understand the quantitative effect of the policy levers at their disposal. Most of the existing literature looks at characteristics of apprentices: the number of apprentices entering and completing programs or the economic returns to apprenticeship (see, for example, Gunderson and Krashinsky 2012; Laporte and Mueller 2010; Paquin 2009; and Skof 2011). Our analysis, however, is not restricted to individuals in apprenticeship programs, since such a narrow focus would ignore those who enter the workforce without needing to follow a formal apprenticeship program.

Measuring the Labour Market Consequences

In looking at the major aspects of apprenticeship programs to determine their effect on employment and average income, we limit ourselves to Red Seal trades where not more than one apprenticeship program is associated with an occupational classification in the province (see the Appendix). In so doing, we need not worry that our results are affected by the difficulty that workers may have in relocating from one province to another once they are certified, although the difficulty of transferring

13 In Ontario, a review process of journeyperson-apprentice ratios began in spring 2012, and final decisions on ratios for the first four trades were made in the fall of that year. Recognizing that none of the parties involved in the review of one of the trades – precast concrete – “had any significant amount of data to provide to the panel” (Ontario College of Trades 2012a), the review panel for these trades chose to retain existing ratios of 1:1 for the first apprentice and 3:1 for subsequent apprentices.

across provincial borders during the training period might be a factor (McGinn 2013). To assess the effect of primary journeyman-apprentice ratios on labour market outcomes, we compare the wages and number of people who work in trades with legislated ratios to the wages and the number of workers in trades without a fixed ratio.¹⁴

We find that, in trades in provinces where there is a journeyman-apprenticeship ratio above one, there are 44 percent fewer workers as a share of the provincial full-time workforce relative to otherwise comparable trades for which there is no fixed ratio (Table 3, column 1). Further, a ratio above one has a much larger effect on employment than a 1:1 ratio.¹⁵ This suggests that a high ratio reduces entry into the labour force and contributes to a shortage of skilled labour in that trade. We also find that, relative to trades with apprenticeship terms of less than two years, employment is 48 percent higher in trades with apprenticeship terms of between two and three years. Similarly, trades with apprentice terms of three to four years have 34 percent higher employment than trades with less than two of years of apprentice training. This suggests that lengthier apprentice programs induce workers to enter a program, but that there are diminishing returns for the longest programs. This finding provides some evidence that apprenticeships impart valuable skills, and that the shortest apprentice terms might result in fewer workers relative to programs of two or three years in length.¹⁶

Several other effects are evident in the results. For example, incomes of workers in trades with low ratios tend to be 6 percent lower than those of workers in trades without restrictions. Most strikingly, incomes in trades with high primary ratios are 10 percent higher than incomes in trades without legislated ratios (Table 3, column 2). A number of interpretations of these results is possible. For one, strict ratios might result in barriers to entry, which is consistent with the idea that higher journeyman-apprentice ratios create market power for incumbents, allowing them to receive higher incomes. Alternatively, stricter ratios might result in workers who are better trained, resulting in the ability of those workers to earn higher wages.

We also find that journeyman-apprentice ratios above one result in 38 percent fewer young workers – those between the ages of 25 and 34 – in a trade (Table 3, column 3). This finding suggests that stricter ratios reduce total employment in a trade by dissuading workers most likely to start a new career from entering a trade or by diminishing the ability of firms to hire younger workers.

Trades that require certification have a higher ratio of workers reporting having completed an apprenticeship (Table 3, column 4). This result makes sense given that workers must obtain certification, through either a formal apprenticeship or passing a qualification test, to practise their trade in provinces with this requirement. Notably,

14 This baseline consists mostly of workers in trades without a legislatively fixed ratio, although some of these trades might have informal 1:1 ratios enforced by trade practice. For example, the Ellis Chart glossary states, “[g]enerally, in the absence of an established ratio, a ratio of one apprentice to one journeyman is used.” In speaking with a number of representatives of major trades in Ontario that do not have a listed ratio in the Ellis Chart, however, we found that these trades do not have an informal journeyman-apprentice ratio, which refutes the statement in the Ellis Chart. The results we report here include workers with variable ratios in the baseline comparison group, but our results do not change substantially when we exclude them entirely or explicitly control for this group’s having a variable ratio.

15 That the coefficient of a ratio of more than 1:1 is greater than the coefficient of a 1:1 ratio passes the significance test at $p < 0.01$.

16 This also fits with the finding by Desjardins and Paquin (2010) that the length of an apprentice program has little effect on apprenticeship completion rates.

Table 3: Effect of Apprentice Regulations on Labour Market Outcomes

Labour Market Outcome:	Employment, All Workers	Average Income, 2005, All Workers	Employment, 25-to-34-year-olds	Share of Workers with Apprenticeship
	<i>(percent)</i>			
Primary Journeyman-Apprentice Ratio^a				
< 1	-6	-6*	-17	10
1:1	-3	0	1	3
> 1	-44*	11*	-38*	21*
Length of Apprenticeship Term^b				
2 to 3 years	48*	-1	28*	-5
3 to 4 years	34*	-1	20	-9
4+ years	32	1	30	-9
Certification^c				
Mandatory to practice trade	13	1	4	14*
Note: a Compared to trades with no fixed ratio. b Compared to apprentice terms shorter than two years. c Compared to programs without mandatory certification. *Denotes effect is statistically significant from zero at 10 percent threshold or beyond. Sources: Authors' calculations from Human Resources and Skills Development Canada and Statistics Canada.				

whether certification is mandatory or voluntary has relatively little other effect on labour market outcomes, such as incomes of those working in trades or the total number of people who work in a trade. However, we also find that trades with a higher ratio have a larger share of workers in the trade with an apprentice certification. These results are consistent with the possibility that workers will seek additional formal training when they are more certain that fewer, or no, competitors without formal training will subsequently enter the market.

One caveat to our results is that we cannot demonstrate conclusively that the causality emanates from the journeyman-apprentice ratios. We would need a quasi-experimental test to prove

that the regulations, and not other factors that we cannot control for, are the underlying cause of our results. However, given the wide range of trades and provinces in our analysis and our lack of a reason to believe that the causality emanates from provinces with few workers in a trade choosing to enact higher ratios in that trade, we are confident that provincial regulation is a determinant of labour market outcomes.

WHY REGULATE APPRENTICESHIPS?

Given the effects of entry restrictions on labour markets, why do governments apply such barriers? The oft-cited rationale is that free competition

could have negative consequences for public or worker safety or for the quality of the work or training of trades workers. In practice, however, such government intervention might worsen market failures.

Government intervention in skilled trades has a lengthy history. Reports in the 1960s and 1970s on the Ontario apprenticeship system argued that governments should intervene to ensure a sufficient number of apprentices to satisfy future labour market needs, but also so as not to allow employers to use apprentices as a source of cheap labour (Armstrong 2008). These rationales, however, do not address the more serious issues of potential market failure in skilled trades training.

Market Failure

Two general rationales exist for regulations on entry into the skilled trades: market failure caused by either asymmetric information or externalities.¹⁷

Asymmetric information: This market failure occurs when consumers have less information about the quality or true cost of the good or service than do sellers. Purchasers face this problem for rarely purchased services or goods for which they cannot ascertain the quality until after the purchase, if at all. In the absence of regulation or the expert inspection of quality, sellers have an incentive to reduce quality; consumers then become less willing to pay for high-quality goods or services, which in turn drives higher-quality providers out of the market.¹⁸ If the policy goal is to ensure high quality, the appropriate policy response is to regulate quality – by, for example, setting and enforcing minimum standards – of services or goods that governments

deem important enough to require such supervision. The regulation of apprentice training, however, would not solve this problem.

Externalities: Competition might result in less training in matters that affect others – such as safety – or in employers having an otherwise reduced incentive to provide training to workers who might leave and compete against them. Thus, in the absence of government intervention, employers and apprentices might underinvest in training. Entry restrictions could ensure that apprentices who invest in their training have a high degree of market power once they begin in their field. Voluntary accreditation programs could result in more entrants who have not completed their apprentice training becoming substitutes for certified journeypersons. A large number of partly trained, competing workers could reduce both the return to completing an apprentice program and the incentive to increase training.

Government Intervention in Practice

Restrictions on entry usually reduce available opportunities for trainees to enter a trade (as a result of a higher journeyperson-apprentice ratio or certification requirements) or the economic returns to entering (by requiring a lengthy apprenticeship term). The provincial regulation of skilled trades reduces the incentive for low-quality workers to enter a trade in the first place. Entry restrictions then could result in prices for services that are sufficiently high that high-quality providers enter, or stay in, the market. However, more restrictive entry requirements might reduce incumbents' incentive to innovate or offer higher-quality

17 This discussion is based on the Competition Bureau's analysis of competition in self-regulated professions (Canada 2007). The economic rationales for restrictions on entry apply equally to skilled trades, but additional regulations in professional services, such as restrictions on advertising, fees, and other practices, generally do not apply to skilled trades.

18 This is akin to the "lemons" problem first discussed by Akerlof (1970).

services, and cause the reduction in quality to be greater than that of the original problem of low-quality entrants.

Does Labour Market Regulation Resolve Market Failure?

There are relatively few data on the effect of restrictions on entry to trades on the policy outcomes the restrictions are meant to achieve. Armstrong (2008) argues, based on “instinct” and anecdote, that requiring trades workers to become certified, presumably undergoing additional safety training, should improve customer protection. He further argues that certification should result in productivity gains, increased safety, higher employee retention rates, reduced skill shortages, and lower health-and-safety-related costs for firms. Armstrong notes, however, that there is little evidence to back such claims.

Safety: Howe (2011) argues that the majority of trades workers killed in electrical accidents were not themselves electricians, which perhaps suggests that only certified electricians should work in this trade. As Armstrong (2008) notes, however, there are no published studies or statistics that enable policymakers to conclude that additional certification requirements or restrictions on entry necessarily increase worker safety.¹⁹

Consumer protection: The theoretical prediction of the overall effect on quality of accreditation requirements or restrictions on entry into trades is ambiguous, and there is no Canadian literature on the effect of apprentice regulations on safety or quality (Cardus 2011; Dijkema and Van Pelt 2011). Studies of occupational licensing in the United States reveal little evidence that consumers receive

higher-quality services – as measured by complaint rates or malpractice insurance premiums – as a result of higher standards (Kleiner 2000; Kleiner and Kudrle 2000; Kleiner and Todd 2009).

Training: Lengthy apprenticeship terms might decrease the willingness of potential entrants to embark on an apprenticeship program, but those who desire comprehensive training might be attracted to trades with long apprenticeship terms. As well, mandatory certification or more restrictive journeyman-apprentice ratios might lead to a higher completion rate among those who begin an apprentice program.²⁰ Evidence shows that certified apprentices who complete their training program have wages that are 12 percent higher than those of apprentices who did not complete their program (Laporte and Mueller 2012). Other research has found a skills premium of close to 5 percent for workers in building trades where certification is mandatory rather than voluntary (Coe and Emery 2012). Coe (2011) finds that lengthier apprenticeship terms are associated with a higher program completion rate, although this finding might reflect a selection bias toward people with higher levels of motivation going into trades with longer apprenticeship terms. Thus, while formal apprenticeship does impart valuable skills, there is no evidence that barriers to entry, such as strict journeyman-apprentice ratios, are necessary to increase skills training.

An Improved Framework for Skilled Trades Regulation

There is limited evidence that restrictions on entry into trades have improved service quality and safety. The Competition Bureau (Canada 2007) argues

19 For an argument that higher ratios would improve safety, see Di Nardo (2012).

20 This finding is confirmed, at least for mandatory certification requirements, by Coe (2011), with the caveat that the result depends on the distribution of certification rules across trades.

that regulators who seek to correct the market failures that result from unregulated skilled trades should rely instead on more direct policy tools related to regulating the quality of work that trades workers provide. Such regulations should have defined and specific objectives linked to verifiable outcomes, and should be the minimum necessary to achieve those outcomes.

Based on these principles, it is clear that regulations on entry are not an effective means of ensuring high quality. Instead, minimum standards of service quality would be less competitively distorting than restrictions on entry. In the case of municipal building inspections, for example, regulatory enforcement is a more direct means of ensuring quality than entrance and training requirements.

The Competition Bureau suggests that a more effective approach would be professional certification administered by government that allows high-quality service providers to signal to consumers that they will provide services of a given quality, while not preventing consumers seeking lower-cost options by purchasing services from uncertified providers (Canada 2007). However, this approach is only possible in occupations in which quality can be verified by external experts. Further, regulatory inspection regimes place both a fiscal cost on governments that operate them and a regulatory burden on firms and people subject to inspections. An outcomes-focused approach may not work in all occupations, and may create additional costs to governments and firms, but may be a better approach than entry restrictions to dealing with the specific problems associated with ensuring quality in skilled trades.

CONCLUSIONS AND RECOMMENDATIONS

Restrictions on the entry of apprentices into the skilled trades reduce the number of people who work in those trades. Further, the incomes of those workers are higher than they would be in the absence of entry restrictions. Thus, if the federal and provincial governments want to increase the number of people working in trades, as they claim is a policy priority, they should take steps to loosen entry restrictions, which particularly affect the opportunities of younger workers to seek employment in the trades and diminish the ability of firms to hire them. Entry and hiring restrictions are only one factor driving the alleged shortage of workers in the skilled trades, but other factors – including stereotypes about the inferiority of employment in the trades to other types of jobs – are far less amenable to specific policy levers to encourage more people to enter the trades.

The regulation of apprenticeships is a common policy tool to ensure that the quality of work skilled trades people perform remains high, but is quality best controlled by restricting entry, as is the current emphasis, or by measuring quality outcomes? We argue that regulators should focus more on assuring the quality of work that trades workers perform, and that restrictions on apprentices should remain only in trades where it is difficult to assess the quality of work. And although employers lack the incentive to train apprentices who later might leave to join a rival firm, restrictive journeyman-apprentice ratios limit the ability of businesses, particularly small ones, to grow by compelling them to adjust their workforce to match ratio requirements. In short, regulating outcomes, rather than inputs, would enable competition to drive service quality among individual trades workers.

APPENDIX

Data Sources

We use two main sources of data in our analysis: the 2004 and 2012 editions of the so-called Ellis Chart produced by Human Resources and Skills Development Canada (HRSDC) as a measure of labour market regulations, and labour market information from the 2006 census.²¹

The Ellis Chart

HRSDC's Ellis Chart provides a province-by-province overview of the requirements for apprenticeship in an occupation. In addition to other factors, it shows whether certification is mandatory, the minimum number of hours required to complete an apprenticeship, and the minimum ratio of journeypersons to apprentices. Each occupation is associated with a four-digit National Occupation Classification (NOC) code, which matches the occupations in both the census and Statistics Canada's Survey of Labour and Income Dynamics (SLID). We use the 2012 Ellis Chart because it provides information on ratios for significantly more province-occupation pairs (306) than do charts from previous years (174 for 2004 and 165 for 2007). When two entries between the 2004 and 2012 Ellis Chart conflict, suggesting a change in policy between 2004 and 2012, we replace information in the 2012 Ellis Chart with information from the 2004 Ellis Chart. For province-occupation pairs with ratios for both 2004 and 2012, we find that 51 primary ratios became less strict, 5 became more strict, and 95 stayed the

same. For pairs with ratios for both 2007 and 2012, we find that 55 primary ratios changed.

The 2006 Census and the Survey of Labour and Income Dynamics

For our main regressions, we use Statistics Canada's National Occupation Classification for Statistics 2006 (720C) topic-based tabulation from the 2006 census to estimate by province the total number of people who report having worked in each occupation as a share of the provincial full-time workforce. This dataset gives us information on workers at a detailed level of occupation classification.²² We also calculate for each occupation in each province the average income of full-time workers in each occupation, the share of employees with apprenticeship training in each occupation, and the number of workers between ages 25 and 34 in each occupation as a share of the provincial full-time workforce.

The 2006 census contains the most comprehensive publicly available data, but it is already six years out of date. Thus, to improve the currency of our results, we use SLID data to 2010 although we do not report our results here. This, however, provides a smaller sample, and Statistics Canada suppresses results for queries that draw on fewer than five respondents. Accordingly, a number of our province-occupation pairs return missing values, and we consider the results to be somewhat less reliable. The consistency of the results from the two datasets gives us confidence, however, that the census data are still valid.

21 All data and Stata code used in this study are available from the authors upon request.

22 For example, this gives us information on people with occupations classified as H411, "Construction millwrights and industrial mechanics (except textile)." For details on the available data, see: <http://goo.gl/P6cD7>.

We merge provincial regulations with census data when the Ellis Chart and the NOC have non-duplicate entries. Sprinkler system engineers and steamfitters, for instance, have the same NOC but separate Red Seal certification programs, meaning that we cannot isolate the number of people in each occupation.²³ We also exclude provincial occupations where none of the respondents in the census sample reported working in that field and province, as well as any occupation for which there are no data for at least five provinces.

Regression Equation

We examine the effect of three regulatory mechanisms on four dependent variables – employment, average income, share of the trade workforce with apprenticeship training, and the share of the trade workforce between ages 25 and 34 – using the following equation for occupations i and provinces p and an error term e :

$$\ln(\text{dependent variable}_{ip}) = \text{Ratio}_{ip} + \text{Hours}_{ip} + \text{Certification}_{ip} + \text{Controls} + e_{ip}.$$

Dependent Variables

The variables we use in our regressions as dependent variables for each occupation i in province p are:

- employment: the total number of people who report having worked in the trade as a share of the total provincial workforce;
- average income: the average income of full-time, full-year workers in that occupation;

- the share of workers in a trade with apprenticeship training;²⁴ and
- the share of the occupation’s trade workforce ages 25 to 34 as a share of the total provincial workforce.

Independent Variables

- Ratio: the number of journeypersons required to take on an apprentice, grouped as no fixed ratio, less than 1, 1:1, and greater than 1. We examine the effect of primary ratios as these apply to all firms, whereas secondary ratios might not apply to a firm. The baseline comparison group is comprised of those not subject to a fixed ratio. We test a number of variations of this group – such as having an explicit control for those with a variable ratio, or dropping them altogether – but the results are largely the same.
- Hours: the minimum number of hours required to complete an apprenticeship, grouped into four categories by number of years of the apprenticeship program. The baseline comparison group is comprised of those whose program is less than two years. Each coefficient represents the effect of a given term length (two to three years, three to four years, and four or more years) relative to an apprenticeship term of less than two years.
- Certification: whether or not certification or completing a registered apprenticeship is mandatory for employment in an occupation.
- Controls: dummy variables for province and occupation.

Appendix Table A-1 presents the results of our main regressions with standard errors clustered at the provincial level. We exclude those with more than two ratios, but include them in other specifications.

23 This also affects the following occupations: ironworker, agricultural equipment technician, heavy duty equipment technician, automotive painter, motor vehicle body repairer (metal and paint), automotive service technician, transport trailer technician, and tower/mobile crane operator.

24 As one reviewer pointed out, however, 2006 was the first year in which census respondents were asked if they held an apprenticeship, so that a large number of respondents reported having completed an apprenticeship although such training does not take place in the occupations in which they reported working.

Table A-1: Regression Results

Dependent Variable	Employment Share	Average Income	Share of Workers in Trade with Apprenticeship	Share of Total Provincial Workforce Ages 25 to 34 in Trade
Mandatory certification	0.122	0.00936	0.134**	0.0364
	[0.110]	[0.0279]	[0.0418]	[0.166]
Length of program (relative to a program of less than 2 years)				
2 to 3 years	0.389***	-0.0127	-0.0547	0.250**
	[0.0821]	[0.0306]	[0.0498]	[0.0774]
3 to 4 years	0.292***	-0.00678	-0.098	0.181
	[0.0760]	[0.0176]	[0.0648]	[0.117]
4+ years	0.276	0.009	-0.0983	0.26
	[0.157]	[0.0248]	[0.0796]	[0.154]
Primary ratio (relative to trades with variable ratios and in which no ratio exists)				
<1	-0.064	-0.0618**	0.0989	-0.182
	[0.147]	[0.0262]	[0.119]	[0.130]
1:1	-0.0266	0.00339	0.0344	0.00927
	[0.0714]	[0.0221]	[0.0899]	[0.0954]
>1	-0.586***	0.104**	0.194**	-0.480*
	[0.158]	[0.0424]	[0.0846]	[0.248]
Provincial/occupational controls	yes	yes	yes	yes
Observations	305	233	295	294
R-squared	0.898	0.931	0.725	0.843

Note: Robust standard errors in brackets.

* Statistically significant at 10% level.

** Statistically significant at 5% level.

*** Statistically significant at 1% level.

Sources: Authors' calculations from Human Resources and Skills Development Canada and Statistics Canada.

In all cases, the dependent variable is in log form, so the exponent of the coefficient gives the predicted percentage change associated with the variable. In all cases, the independent variables are indicator (dummy) variables, and the coefficients represent the percentage change, when exponentiated, in the dependent variable of the effect of that policy.

We test several alternate specifications, including using each ratio as a separate category, using

minimum hours as a continuous variable instead of a categorical one, and testing the change in average income from 2001 to 2006, as opposed to the level in 2006. Although not reported here, in almost every specification the signs on our main conclusions are consistent, but the results are not always statistically significant even when the magnitude of the effect is quite large.

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