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Bigger *Is* Better: Reducing the Cost of Local Administration by Increasing Jurisdiction Size in Ontario, Canada, 1995–2010

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Abstract

In recent decades, the belief that larger municipalities can better capture economies of scale led to compulsory amalgamations in several countries. This article examines such a program of compulsory amalgamations in Ontario, Canada, during the late 1990s and early 2000s. By exogenously deciding on a course of municipal restructuring, and leaving a large comparison group of nonamalgamated municipalities within the same institutional framework, the Ontario reforms created a quasi-experiment on the importance of scale for local government. Using a difference-in-differences methodological approach, this article exploits the quasi-experimental setting of the Ontario reforms to examine the causal effect of jurisdiction size on the cost of local administration. The main empirical finding in this article is that increasing local jurisdiction size reduces the cost of local administration. The results provide the most convincing evidence to date that economies of scale exist in local administration and can be captured through consolidation.

Keywords

municipal amalgamation, economies of scale, Ontario, Canada, local government consolidation

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Introduction

What is the optimal size of local government? For local government scholars, few questions have attracted more sustained debate or empirical analysis (Denters et al. 2014; Keating 1995). Since the 1960s, a large theoretical and empirical literature has examined the question from a variety of perspectives. Perhaps the most contentious issue has been the relationship between jurisdiction size and the cost of local government services. Early contributions sought to identify the scale economies of various local government services for the purpose of determining the optimal, cost-minimizing size for local jurisdictions (Hirsch 1959). From an alternative perspective, scholars working within the public choice tradition posited that smaller local governments better captured the efficiencies of serving more homogeneous communities of like-minded citizens, and faced more pressure to minimize waste (Oates 1972; Ostrom 1972; Peterson 1981; Tiebout 1956). Although no clear scholarly consensus has emerged, the widespread reform of local government in a number of developed countries during the past 30 years overwhelmingly reflects the view by public policy makers that larger local jurisdictions are more efficient (Dollery and Robotti 2008; Drew, Kortt, and Dollery 2014; Drew, Kortt, and Dollery 2016b; Garcea and LeSage 2005). The notion that larger municipalities can better capture economies of scale has been the principal driving force behind compulsory or semivoluntary amalgamations in several countries, including Australia (Byrnes and Dollery 2008), Canada (Sancton 2000), Denmark (Mouritzen 2010), Germany (Blesse and Baskaran 2013; Lenk and Falken-Großer 2008), Greece (Hlepas 2010), Israel (Reingewertz 2012), and New Zealand (Reid 2008). In nearly all cases, municipal amalgamations were intended to deliver cost-savings by creating larger local governments capable of capturing economies of scale in service provision (Andrews and Boyne 2009; Baldersheim and Rose 2010; Sancton 2000).[1] For proponents of municipal consolidation and compulsory amalgamations in particular, however, the results appear discouraging. Numerous descriptive studies report little to no evidence that amalgamation produces cost-savings (Bish 2001; Dollery, Byrnes, and Crase 2007; Hanes 2014; Knight and Gordon 2008; Sancton 1996).

This article examines such a program of compulsory municipal amalgamations in Ontario, Canada. In the late 1990s, the Ontario government initiated the most sweeping restructuring of local government in Canadian history. The enunciated goal was to reduce the size of municipal government by eliminating waste and duplication in municipal administration and reducing the number of elected local politicians. Through waves of amalgamations, the number of Ontario municipalities was reduced by nearly one-half, and local

politicians by about one-quarter. These reforms reflected a remarkable shift in provincial–local relations in Ontario, with repercussions extending to other Canadian provinces, as others scholars have noted and analyzed (Sancton 2000; Sancton and Young 2009). But the widespread reform of municipal structures in Ontario also affords a unique opportunity to investigate the causal effect of jurisdiction size on the cost of local administration.

Under ordinary circumstances, measuring the effect of local jurisdiction size on the cost of government services is a difficult task. Local boundaries change infrequently. When changes do occur, especially voluntary ones (e.g., annexation), it is often precisely because new boundaries are expected to ameliorate particular local policy problems (e.g., fiscal insolvency), and so the causal direction of the relationship is unclear. Even when changes are decided exogenously to municipalities, such as when central authorities impose new structures, there are often other forces also at work, such as significant shifts to municipal responsibilities or revenues, the effects of which are difficult to isolate from the scale of the municipality itself.

But the Ontario reforms were extraordinary. By 2010, 587 municipalities were variously amalgamated to form 146 new municipalities, while 297 municipalities were left with their boundaries unchanged. By compelling changes to municipal boundaries that were exogenous to local administration costs, and leaving a large comparison group of nonamalgamated municipalities within the same institutional framework, the Ontario reforms created a quasi-experiment on the importance of scale for local government. Using a difference-in-differences methodological approach, this article exploits the quasi-experimental setting of the Ontario reforms to examine the causal effect of jurisdiction size on the cost of local administration.

This article is not the first to realize the methodological benefits inherent in such quasi-experiments in local jurisdiction size. Similar compulsory or semivoluntary amalgamation programs in Sweden, Denmark, and Israel have been investigated to examine how local jurisdiction size affects various political and economic outcomes, including democratic quality (Hansen 2015; Lassen and Serritzlew 2011), citizen satisfaction (Drew, Kortt, and Dollery 2016a), fiscal policy (Hansen 2014; Hansen, Houlberg, and Pedersen 2014; Jordahl and Liang 2010), service delivery (Foged 2016), organizational culture (Bhatti, Gørtz, and Pederson 2015), and governance costs (Blom-Hansen et al. 2016; Hansen, Houlberg, and Pedersen 2014; Reingewertz 2012). The focus in this article is on administration costs, because all municipalities—regardless of their national or subnational legislative and political frameworks, their responsibilities, tasks, and resources—must maintain a basic political and administrative governing structure.

The main empirical finding in this article is that increasing local jurisdiction size reduces the cost of local administration. This is consistent with Reingewertz (2012) and Blom-Hansen, Houlberg, and Serritzlew (2014), who studied similar quasi-experiments created by national consolidation programs in Israel and Denmark, respectively. This article builds on these studies, and adds a remarkably broad, deep, and balanced panel of Ontario municipalities, which includes 331 municipalities (102 amalgamated municipalities and 229 nonamalgamated municipalities), ranging in population size from 166 to 2.7 million persons, with observations over a period of 16 years. Two unique characteristics of the Ontario amalgamations, the staggered implementation of the amalgamations and the significant variation in the relative size and complexity of the mergers, allow the relationship between jurisdiction size and administration costs to be more thoroughly explored. One original contribution of this article is the result of an empirical framework that distinguishes between cost-savings that vary with the relative size of the amalgamation and those that do not. This analytically separates cost-savings accrued through scale effects from those that result from the various administrative and organizational reforms that can also occur during municipal mergers. Whereas previous research shows that *increases* to jurisdiction size lead to *reductions* in administration costs, this article finds a similar result but also demonstrates that *relatively larger increases* to jurisdiction size produce *proportionately greater reductions* in administration costs. Together, these findings provide the most convincing evidence to date that economies of scale exist in local administration and can be captured through consolidation.

The rest of this article proceeds as follows. First, there is a review of theoretical and empirical literature concerning the relationship between local jurisdiction size and government costs. Second, the Ontario reforms are introduced and described. Because of their significance, this period of provincial–municipal relations in Ontario has already attracted considerable scholarly attention—at least by Canadian standards—so the review is brief, and the focus is on the structural reforms and their suitability for a quasi-experimental research design. Third, the study is explained, and the data are introduced. The main variable of interest is annual municipal administrative expenditures, which is measured using municipal financial data on the wages, salaries, and benefits paid annually to municipal administrative employees and to municipal politicians. Fourth, the results are reported and interpreted. Finally, the conclusion considers the significance of these results for scholarly debates on the optimal size of local jurisdictions, and for policy makers interested in consolidating local governments as a means to reduce expenditures.

Jurisdiction Size and the Cost of Local Government

From an economic perspective, smaller jurisdictions are argued to be more efficient, mainly through the well-known Tiebout (1956) model, where heightened competition with neighboring municipalities constrains government spending and compels the delivery of local services closely tailored to local preferences (Schneider 1989). Conversely, the economic advantages of larger municipalities are thought to mainly reside in their capacity to capture economies of scale in the production of local services. Such increasing returns to scale occur when the average per-unit cost of production falls as the quantity produced rises, because the fixed costs of production are spread across greater output, and the production process accommodates increasing specialization. At some level of output, however, decreasing returns to scale can occur as the variable costs begin to rise, because of factors such as congestion in the production process and the challenges of coordination and management.

For local governments, scale economies undoubtedly vary among different service areas. The classic distinction is between so-called "hard" services, which relate mainly to infrastructure, are capital-intensive operations, and are most efficiently provided over larger populations, and "soft" services, which are those delivered directly to citizens, are labor intensive, and are typically most efficient at smaller scales (Bird and Slack 1993). Even within service areas, however, scale economies are actually an aggregation of the costs and outputs of the various individual operations that comprise the service. Road maintenance, for instance, includes pothole repair, resurfacing, street cleaning, and snow removal in the case of Canadian municipalities. Each operation (e.g., resurfacing, street cleaning) entails its own "plant-level" economies of scale, which together comprise the "firm-level" economies of scale for the service (e.g., road maintenance; Byrnes and Dollery 2002). A useful distinction can be made between provision and production processes. The former concerns the decision-making, management, and administration apparatus surrounding the governance issues of which services to provide, how, and at what quantity and quality. The latter concerns the actual means of production, which includes capital investment decisions and larger questions about alternative delivery mechanisms, such as private contractors, or partnerships with other municipalities or governmental authorities (Oakerson 1999).

One implication of this distinction is that even small municipalities can realize economies of scale by seeking out alternative service producers operating more efficiently over larger territories, and so local jurisdiction size may not be a key determinant of service costs. A second implication is that the scale effects of provision and production processes should be considered

separately. All municipalities, regardless of size or responsibilities or service delivery mechanism choices, require a basic political and administrative structure responsible for making service provision decisions, along with performing other core governance tasks. For these administration costs, larger municipalities may benefit from the increased specialization and managerial competence afforded by the size of their administrations, while smaller municipalities are disciplined by the imperatives of competition to maintain lean bureaucracies, and their smaller and more homogeneous populations may present less complex policy challenges (Andrews and Boyne 2009; Ting, Dollery, and Villano 2014).

There is large empirical literature on the relationship between municipal government size and the cost of local services. A recent survey finds only "mixed evidence" of a relationship between size and costs (Blom-Hansen, Houlberg, and Serritzlew 2014, p. 792), while another concludes that "there is a great deal of uncertainty about whether economies of scale exist in local government service provision" (Byrnes and Dollery 2002, pp. 392–93). Two possible explanations for this ambiguity concern methodology. In most studies, costs are measured by government expenditures and output is measured as costs per person. Relying on government expenditures to determine service costs can be problematic because government accounts are often not so neatly or conveniently organized, and the allocation of overhead and other administrative costs adds further complications (Byrnes and Dollery 2002; Slack and Bird 2013). Moreover, controlling for service levels and quality adds many more difficulties. It is seldom done, though there have been exceptions (Found 2012; Reingewertz 2012). As a result, population size is often used as a proximate measure of output.[2]

Most studies approach the basic question using cross-sectional or panel data on municipal populations and service costs, and they include various controls to account for factors other than population size that may drive local government costs, such as population density, income, age, and intergovernmental transfers (e.g., Andrews and Boyne 2009; Nelson 1992). The difficulty with such approaches is the influence of omitted variables and the problem of reverse causality (Besley and Case 2000). In Ontario, for example, municipalities with low populations are primarily rural. Due to the small scale of municipal operations, the dispersal of residents, and, in the case of northern Ontario municipalities, sheer remoteness, the per capita costs of municipal services can run high in such communities. However, lower income levels among rural residents might lead to lower demand for certain municipal services. In the absence of a complete and fully specified set of statistical controls for such factors, the results may be biased in either direction, and causality remains unclear. Even with a full and accurate set of

statistical controls, however, the problem of reverse causality may persist. A municipality with particularly cost-effective services may attract residents from neighboring municipalities that operate less efficiently. In this case, it is the cost of local government services that is affecting jurisdiction size, not the reverse. A similar problem can also arise in cases where changes to jurisdiction size occur voluntarily between municipalities, such as through annexations (Liner 1992; Mehay 1981) or voluntary amalgamations (Nelson 1992). In such cases, boundary changes are often a response by local officials to problems related to the high cost of local services.

To address the problem of reverse causality, researchers have examined cases where changes in jurisdiction size were largely exogenous to local communities, such as through compulsory amalgamations. In 2007, for example, the Danish national government initiated a "semi-voluntary amalgamation reform" of its system of municipal government, which resulted in 237 municipalities merging to form 65 new municipalities (Blom-Hansen, Houlberg, and Serritzlew 2014, p. 794; Mouritzen 2010). Importantly, 33 municipalities were left with their boundaries unchanged, providing a group of municipalities to help control for other important reforms during this period, including shifts in local responsibilities and changes to intermunicipal financial transfers. Approaching this case as a quasi-experiment, Blom-Hansen, Houlberg, and Serritzlew (2014) found that amalgamation reduced administration costs by about 10%, with the savings materializing within five years; a subsequent study concluded that amalgamation had no effect on the cost of municipal services (Blom-Hansen et al. 2016). Employing a similar research design, Reingewertz (2012) reported that a small number (23) of forced amalgamations in Israel in the early 2000s caused reductions in total municipal expenditures of about 9%, and with no measurable decrease in service levels or quality. Bell, Dollery, and Drew (2016) evaluated the natural experiment created by compulsory amalgamations in New South Wales (Australia) during the early 2000s, and found no statistically significant difference between amalgamated and nonamalgamated municipalities across a number of financial performance indicators. Each of these studies, however, defines amalgamation as a binary treatment: An area either experiences a change in municipal jurisdiction size or it does not. But the relative size of amalgamations can vary enormously. In areas where old boundaries appear especially outdated, such as where rapid growth is occurring, the change in jurisdiction size may be profound in terms of both population and territorial size, while smaller, slower-growing urban centers might experience only modest restructuring. Mergers can also be more or less complex, depending on the number of municipalities involved and their relative sizes (Kushner and Siegel 2005). In Denmark, the number of merging municipalities varied

from 2 to 7; in Ontario, they ranged from 2 to 23. Although continuous treatment variables have been used to study the effects of amalgamation size on a range of outcomes—such as local democracy (Hansen 2013; Lassen and Serritzlew 2011), common pool problems (Blom-Hansen 2010; Hansen 2014), and alternative service delivery (Foged 2016)—they have not been used to examine how amalgamation size affects administration costs.

This illuminates a final problem concerning the distinction between the scale effects of increasing jurisdiction size and the reform effects of amalgamation. There is a wealth of anecdotal and case study evidence suggesting that the process of amalgamation exerts its own influence on government costs, which is not strictly a function of jurisdiction size (Fox and Gurley 2006; Sancton 2000). From an organizational perspective, the process of amalgamation involves combining previously separate and distinct municipal organizations. This creates a window of opportunity for officials to pursue reforms that are otherwise difficult to achieve, such as implementing new IT systems, or eliminating unnecessary functions and boutique neighborhood services. At the same time, officials often face significant pressure from special interests, including those from neighborhoods hoping to maintain unique services, organized labor groups (especially those representing municipal employees), and business seeking continued privileges. A common finding in case studies of Canadian amalgamations is that amalgamation leads to a reduction of the number of municipal employees, but the wages and salaries paid to employees of the new municipality tend to reflect the highest among the predecessors (Hamilton 2013; Sancton 1996). The consequence is that "this harmonization of wages and salaries generally outweighs any cost savings" (Slack and Bird 2013, p. 7). A similar pressure to harmonize upward has also been observed for service levels, and consequently for related fees, charges, and taxes (Slack and Bird 2013; Hamilton 2013; Sancton 1996). It may be true that such reform effects of amalgamation cancel out economies of scale, but a proper analysis demands that they be distinguished from scale effects.

In summary, the existing literature is divided on the question of how local government size affects the cost of local services. Smaller municipalities are argued to have lower costs, due mainly to their more homogeneous populations and their greater sensitivity to the imperatives of intermunicipal competition. Alternatively, larger municipalities can more readily capture economies of scale in local government services. A large body of empirical research has not resolved this debate, though methodological difficulties may be at least partially to blame. Recent approaches, however, have overcome some of these difficulties by utilizing the exogenous variation in local government jurisdictions and quasi-experimental setting supplied by centrally initiated

municipal government reforms. Their findings provide compelling evidence that amalgamation lowers local administration costs. What is not clear, however, is why this is so. For practitioners and proponents of amalgamation, this question may not appear highly relevant. Yet, identifying why amalgamation lowers administration costs does have important implications, as reformers contemplate minimum size thresholds for local governments, for example, or consider whether to pursue modest amalgamations or more expansive undertakings. From a theoretical perspective, such questions underscore the need to distinguish the scale effects of boundary expansion from the reform effects of amalgamation. If reform effects account for the bulk of any cost-savings realized through amalgamations, then the economic argument in favor of larger local jurisdictions is gravely weakened. What is required, then, is an approach capable of distinguishing between these two contemporaneous effects. As always, good fresh evidence helps.

A Quasi-Experiment: Municipal Amalgamations in Ontario, 1995–2010

The province of Ontario, Canada, had a population of 13.1 million people in 2010 (39% of the Canadian total). Most of the province resides in the south, in a largely urbanized corridor centered on Canada's largest city, Toronto, and surrounded by the Great Lakes and fertile agricultural lands dotted with smaller communities. The north is more sparsely populated, with communities built on sites of resource extraction and processing and a significant number of First Nations aboriginal communities. The system of municipal government is large by Canadian standards. Of Ontario's gross domestic product of Can$612 billion in 2010, 6% was spent by municipalities and the special purpose authorities over which they exercise varying degrees of control. The Canadian average is 4.7%. Ontario's municipalities, like those elsewhere in Canada, are multipurpose authorities that provide mostly property-related services and rely on property taxes for revenues. Policing and fire services are municipal responsibilities, as is public transit in larger urban areas. Unlike other Canadian provinces, Ontario requires its municipalities to deliver social assistance programs on its behalf, and pay a significant portion of the cost. Public education is provided through local school boards—not municipalities—in Ontario as it is throughout Canada. Property taxes accounted for 39% of municipal revenues in 2010, only slightly below the Canadian average of 41%.[3] In Ontario, as in most of Canada, political parties do not figure prominently in municipal elections. In most urban areas, councillors are elected through wards; in rural areas, at-large elections dominate. Everywhere, mayors (or, in some rural areas, reeves) are elected through

a municipality-wide vote and are members of council with few executive authorities. The councils of upper-tier municipalities are generally indirectly elected, though there are exceptions.

In 1995, there were 884 municipalities in Ontario. Historically, most small- and medium-sized cities were governed by a single-tier municipality, whose boundaries had expanded incrementally over time. On the urban fringe and in rural areas, there were two levels of municipal government: a lower-tier system of villages, towns, and townships, with an upper-tier county government layered above them, itself governed by a council comprising the heads of the lower-tier municipalities. After the Second World War, the province began replacing urbanizing counties with functionally stronger upper-tier structures—regional governments—whose territorial jurisdictions were expanded to include single-tier cities, which had long been functionally separate and largely autonomous from the county governments in which they were nested. By the mid-1970s, 11 such regional governments had been created, with the Municipality of Metropolitan Toronto being the largest and most well known. Others include York Region, Niagara Region, and Waterloo Region. To accommodate these new structures, the province also reorganized many of the constituent lower-tier municipalities, amalgamating together small towns and villages with neighboring townships, often despite local resistance (Sancton 2000).

This system of municipal government survived into the early 1990s, more or less unchanged. In 1995, the Progressive Conservative party, led by Premier Mike Harris, formed a new provincial government. Although neither the party's platform nor its campaign rhetoric directly mentioned municipal amalgamations, the government's first major legislative act included establishing local restructuring as a provincial objective, and introducing streamlined procedures for amalgamations of the lower-tier municipalities in the county structures outside of the regional governments.[4] To be approved, local restructuring proposals required support from a majority of the municipal councils affected by the proposal, and those municipalities had to represent at least half of the affected electorate. If the municipalities were part of a county, approval was also required from the county council. Alternatively, if support was insufficient, a single municipality could request the appointment of a government commission to resolve the matter, which would be given broad authority to impose new structures that could generate efficiencies.

Initially, there was little participation. This changed suddenly following the contentious ruling of the province's first appointed commissioner, who ordered the merger of an entire county, consisting of 21 lower-tier municipalities, with a formerly separately governed urban municipality. This was despite the fact that only one small municipality in the area supported the

proposal. To avoid a similar outcome, counties and their constituent municipalities began hastily proposing local restructuring agreements on terms they considered at least marginally less disagreeable. By the autumn of 1999, there were 229 fewer municipalities in Ontario, nearly all of which had been eliminated through locally negotiated amalgamations. In two cases, the negotiations led to entire counties merging together into a single-tier municipality. In one other instance, a mostly rural county, negotiations broke down and a commissioner was requested to resolve the matter. Again, the commissioner ultimately ordered that the two tiers of municipal government be merged into a large, single-tier municipality, now known as Kawartha Lakes. Only 3 of the province's 26 counties did not experience at least some municipal restructuring. In only one case did an amalgamation involve municipalities from two separate counties, and only a very few involved separated cities.

In 1996, as this process unfolded, the Harris government also passed separate legislation implementing the largest municipal amalgamation in Canadian history, ordering the merger of Metropolitan Toronto with its six constituent municipalities, including the City of Toronto, into a new City of Toronto (often referred to as the Megacity).[5] In 1999, shortly after winning its second provincial election, the Harris government introduced what became its final restructuring initiative.[6] In this wave, special advisors were assigned to examine the structures of 4 of the province's 10 remaining regional governments. Like the commissioners who preceded them, the advisors were tasked with assessing options that could reduce the size of municipal government, thin its bureaucracy, lower its property taxes, and result in fewer local politicians. In all four regions, the advisors recommended merging the regional governments and their constituent municipalities into large, single-tier municipalities. In one unusual case, where the predicted urban growth had never materialized, the advisor opted to split the region into two single-tier municipalities along former county lines (Sancton 2000, pp. 141–59). The remaining six regional governments and their 43 constituent municipalities were left unchanged.

By 2002, the number of municipalities in Ontario had been reduced to 447, and the province's interest in restructuring waned. A few amalgamations in subsequent years reduced the number of municipalities further to 443 by 2010. The Ontario reforms were extraordinary in the swift and heavy-handed actions of a central authority over its system of municipal government and the remarkable breadth of the structural changes. But two features of the reforms are especially important for local government scholars, for they provide a rare opportunity to examine the importance of local jurisdictions in a quasi-experimental setting (Blom-Hansen, Morton, and Serritzlew 2015; Meyer 1995).

First, the reforms were incomplete. While 587 municipalities were merged to form 146 new municipalities, the gradual abandonment of the program resulted in a further 297 municipalities being left with their boundaries unchanged. For the purposes of causal analysis, this creates a group of municipalities receiving the "treatment" (i.e., amalgamation) and a group of municipalities that were unaffected, the "control." The existence of a large control group of unaffected municipalities is needed, because the reforms were accompanied by a significant realignment of municipal functions and finances. Beginning in 1998, social housing became a municipal responsibility, as did land ambulances. Municipalities were also required to administer all provincial social assistance programs and pay a much more significant portion of the costs. Municipal operating expenditures in Ontario did increase sharply following the realignment exercise (from Can$1,445 per capita in 1997 to Can$1,913 in 2001). At the same time, provincial transfers to municipalities for transit, policing in rural areas, and public health were either cut significantly or eliminated altogether (Graham and Phillips 1998; Siegel 2009). The fiscal burden for municipalities was lessened in the short run through some transitional provincial funds. Over the long run, the province claimed that the realignment exercise would be revenue-neutral, as it uploaded a large portion of education costs, stripped school boards of their authority to levy property taxes, and allowed municipalities to occupy the vacated property tax room. Nevertheless, the changes to municipal finances and functions were comprehensive and affected all municipalities. Without a comparable control group, distinguishing between the effects of amalgamation and downloading on the cost of local administration would be an impossible task.

Second, the decisions about amalgamations were largely exogenous to local administration costs. Regional governments and their constituent municipalities were excluded, at least initially, as was one district that was functionally equivalent to a regional government and one county that had also been restructured since the 1960s. Later, the reform did encompass regional governments, but only selectively. Although the province's decisions about which regional governments to amalgamate were nonrandom, they appeared to depend mostly on perceptions of political dysfunction, rather than municipal costs (Sancton 2000, pp. 142–59). In the counties, which were the original targets of the reform, municipalities could choose whether or not to amalgamate, and with which municipal partners. This raises the possibility of selection bias. The options available to municipalities, however, were greatly constrained. The amalgamation process was organized at the county level, and mergers were generally proposed and considered together as parts of a countywide restructuring plan. The central task in

developing these plans was to develop a restructuring plan that each municipality would prefer—if only slightly—to the perceived consequences of a provincially imposed solution, which was assumed to be a countywide amalgamation, possibly with a neighboring town or city. Amalgamations involving municipalities in neighboring counties or separated cities were unlikely to receive county approval, as were those that resulted in large imbalances in population or financial resources among county members. Uncooperative municipalities could be coerced into agreement by the threat of provincial intervention, or, as occurred in some cases, find themselves forcibly amalgamated by a majority of other county members. Although the motivations of each municipality are not readily observable, case studies of this restructuring process in four counties indicate that administrative issues, including costs, did not have much influence on amalgamation decisions (R. J. Williams and Downey 1999).

Data and Empirical Framework

Data

The basic strategy in this article is to assess the effect of changes in jurisdiction size on administrative expenditures by measuring the changes in outcomes in amalgamated municipalities before and after the mergers occurred and contrasting it with those of nonamalgamated municipalities over the same period. To enable accurate pre- and posttreatment comparisons, preamalgamation outcomes are calculated by aggregating data among municipalities involved in a given amalgamation to form a single pretreatment observation, and these are then compared with postamalgamation outcomes and contrasted with the outcomes in nonamalgamating municipalities.[7] In 99 municipalities, these comparisons cannot be made precisely, as either their boundaries were altered by annexations during the period or they were amalgamated with a municipality whose boundaries were likewise altered; these 99 municipalities are excluded from the analysis. Another 6 municipalities are excluded because they underwent two amalgamations during the study period. One tiny island municipality is excluded as an anomaly (its average annual population is two persons), and another is excluded for missing data. Finally, one municipality is excluded because it was formed through an amalgamation that occurred very late in the study period (2009). This leaves a sample of 331 municipalities, of which 102 are amalgamated and 229 are not. As the summary statistics in Table 1 illustrate, the sample is broadly representative of the province as a whole.

Table 1. Summary Statistics.

	Ontario			Sample			Amalgamated			Nonamalgamated		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Administrative wages per capita 1995	443	122.32	366.93	331	106.65	83.43	102	94.51	42.69	229	112.05	95.78
Administrative wages per capita 2010	443	162.70	265.16	331	155.71	146.93	102	113.20	62.36	229	174.65	168.38
No. of municipalities merged	443	1.12	2.15	331	1.06	2.26	102	3.45	2.90	229	0.00	0.00
Relative population increase	443	0.53	0.98	331	0.48	0.97	102	1.55	1.17	229	0.00	0.00
Average household income 1995	434	48,696	10,866	331	48,578	10,891	102	47,142	9,453	229	49,218	11,435
Population density 1995	441	165.89	351.36	331	138.51	325.06	102	76.34	377.46	229	166.20	295.51
Population 1995	443	31,675	126,027	331	35,446	142,435	102	43,934	226,937	229	31,666	80,645
Share young 1995	441	21.39	3.22	331	21.32	3.20	102	21.25	2.70	229	21.35	3.40
Δ_share_young	433	−2.01	4.26	331	−2.05	3.93	102	−2.01	1.51	229	−2.07	4.62
Share elderly 1995	441	13.84	4.62	331	13.74	4.69	102	14.52	4.25	229	13.39	4.85
Δ_share_elderly	433	4.02	8.36	331	4.14	8.59	102	3.44	13.85	229	4.45	4.59
Population growth	443	0.46	3.80	331	0.16	2.58	102	0.45	3.18	229	0.04	2.26
d_amalgamated	443	0.33	0.47	331	0.31	0.46	102	1.00	0.00	229	0.00	0.00
d_under 3000 persons	443	0.34	0.47	331	0.37	0.48	102	0.20	0.40	229	0.45	0.50
d_over 100,000 persons	443	0.06	0.24	331	0.07	0.25	102	0.06	0.24	229	0.07	0.26

Note. Descriptive statistics are for uncentered variables. Household income and youth and elderly cohort population shares are unavailable for some Ontario municipalities due to their small populations.

The key outcome measure is annual municipal expenditures on administrative employees, expressed per capita in Canadian dollars adjusted for inflation to 2010 prices. There are some limitations with using this measure. First, it is not a complete measure of administrative expenditures. Some expenses, such as building overhead and materials, are omitted, as there are significant variations among municipalities in how such expenditures are recorded, particularly during the early years of the study period. Also omitted are the costs of administrative services procured through contracts with private firms or other municipalities. This a potentially greater concern, as municipalities in Ontario sometimes contract out particular administrative functions, such as certain specialized legal services. If such decisions are not randomly distributed among municipalities in the sample, then it may lead to outcome measures that are artificially low for the treatment or control group, and thus could produce biased estimates of the treatment effect. Although systematic data are not available, it seems likely that contracting out for administrative services would be negatively associated with municipal population size, as more populous municipalities would have larger administrations justifying higher degrees of specialization. If this bias does exist, it will lead to conservative estimates of the effect of amalgamation on administrative services, as prereform municipalities are more likely to rely upon contracted services than their larger, postreform counterparts.

Second, capital expenditures and depreciation are excluded, as comparable data are unavailable for the entire study period. This does mean that administration costs are likely underestimated for some amalgamated municipalities in the years following the merger, as the disposal and acquisition of capital assets (e.g., constructing a new city hall and selling or repurposing previous administrative headquarters) can result in short-term expenditure increases. This is almost certainly the case for information and communications technology systems, as new systems are often purchased (or leased) following amalgamation. These are transition costs, however, and are unlikely to reflect the relationship between jurisdiction size and administration costs in the long run.

Finally, the figures used for calculating administrative expenditure levels are self-reported by municipalities to the province, so errors are possible, as are variations among municipalities in accounting practices. But the reports are accompanied by highly detailed instructions set by provincial officials and are also audited and corrected, if necessary.[8] As such, variations are likely minimal and not systematic.

Figure 1 presents the group means of the annual administrative expenditures for amalgamated and nonamalgamated municipalities, adjusting for inflation to 2010 prices. The figure reveals a striking divergence in the levels

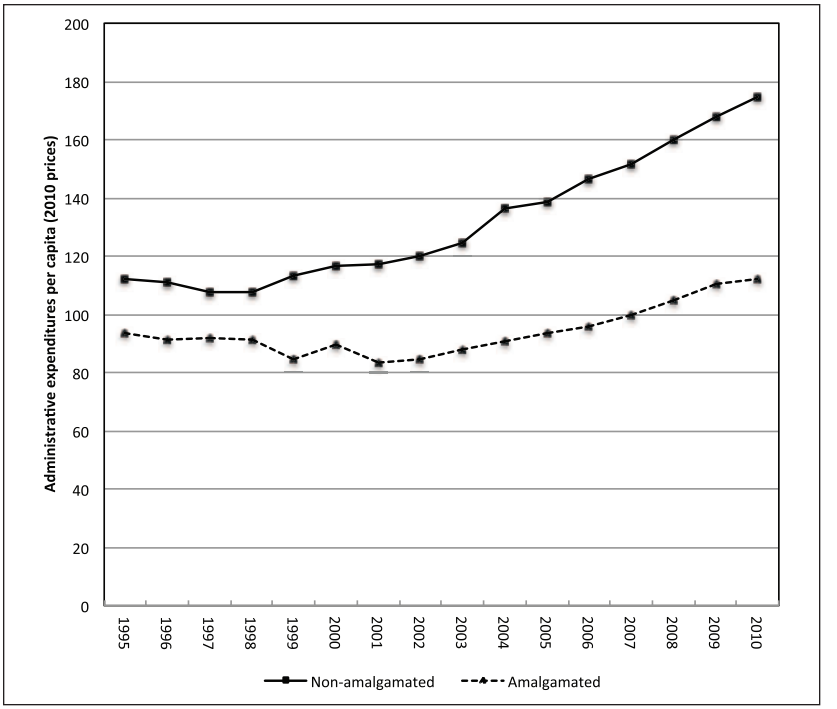

Figure 1. Group means.

of administrative expenditures for the groups, particularly after 1998, when the first large wave of amalgamations is implemented. Although administrative expenditures levels in both groups rise over the study period, they do so much more sharply in nonamalgamated municipalities, on average. For amalgamated municipalities, mean administrative expenditures rise from Can$94 per capita in 1995 to Can$112 in 2010, which amounts to an increase of Can$18 per capita, or 19%. For nonamalgamated municipalities, expenditures rise from Can$112 in 1995 to Can$175 in 2010, an increase of Can$63 per capita, or 56%.

Empirical Framework

As Figure 1 indicates, administrative expenditure levels differed substantially between amalgamated and nonamalgamated municipalities even before the reforms were introduced. To account for these differences, this study uses

a difference-in-differences statistical approach (Beck and Katz 1995; Meyer 1995; Wooldridge 2009). Formally, the basic econometric model is,

$$Y_{it} = \alpha_{it} + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 \left(Treat_i \times Post_t \right) + \beta_3 \mathbf{X}_{it} + \varepsilon_{it},$$

where $Treat_i$ indicates whether or not municipality was amalgamated. $Post_t$ is a time period indicator that equals 0 for the pretreatment period (1995) and 1 for the posttreatment period (2005–2010).[9] The coefficient of interest is β_3, which is the estimate of the pre–post change in the administrative expenditures of amalgamated municipalities relative to the corresponding change in nonamalgamated municipalities. Finally, $\mathbf{X}_{it}$ is a vector of control variables. There are time invariant controls used to help account for pretreatment differences among municipalities. These include measures for population, population density, population growth, average household income, and youth and elderly population shares, all of which have been shown to be significant determinants of municipal expenditures in Ontario (Kushner et al. 1996). They are calculated using Statistics Canada census data, linearly interpolated for intercensus years. Natural logs of population, population density, and household income are used to address skewness. There are also time variant controls that designed to capture changes in factors that influence administrative costs and may differ between amalgamated and nonamalgamated municipalities for reasons unrelated to the change in jurisdiction size. These measure annual changes in youth and elderly population shares and in population.[10] Two additional dummy variables are included as controls, indicating very small municipalities (less than 3,000 persons) and very large municipalities (greater than 100,000 persons). Per capita expenditures are especially high for each group. In all estimates, robust standard errors are clustered at the municipal level to adjust for serial correlation in the panel data (R. L. Williams 2000).

Results and Analysis

Initial Estimates

Table 2 shows the estimated effect of amalgamation on real administrative expenditures per capita for the full sample of 331 municipalities. Model 1 reports the results of the basic model without any statistical controls. As the coefficient for *Merged* indicates, there are large initial differences between the groups of amalgamated and nonamalgamated municipalities. These differences are persistent and significant, and indicate that administration

Table 2. The Effect of Amalgamation on Administrative Expenditures.

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	1998 Cohort	1999 Cohort	2001 Cohort	1998 Cohort	1999 Cohort	2001 Cohort
Dependent Variable				Real Administrative Expenditures per Capita (CDN)			Annual Change in Real Administrative Expenditures per Capita (CDN)		
Merged	−15.62*	−0.53	1.93	−0.61	−0.07	9.69	−1.58	−0.57	1.35
	(8.20)	(8.95)	(8.41)	(10.07)	(12.43)	(14.86)	(1.29)	(1.45)	(1.83)
Merged × post	−38.35***	−35.48***	—	—	—	—	—	—	—
	(6.21)	(5.03)							
post	46.06***	45.97***	—	—	—	—	—	—	—
	(4.57)	(4.65)							
Merged × 1996	—	—	−1.46	−2.28	−1.35	−2.01	—	—	—
			(1.62)	(1.61)	(2.09)	(3.00)			
Merged × 1997	—	—	1.95	5.08*	0.18	−3.25	8.29***	−0.26	−4.15*
			(2.57)	(2.70)	(3.31)	(5.08)	(2.39)	(2.30)	(2.18)
Merged × 1998	—	—	0.89	−0.09	13.45**	−2.51	−2.05	13.4**	0.29
			(3.52)	(5.54)	(5.35)	(4.31)	(8.39)	(6.09)	(2.91)
Merged × 1999	—	—	−10.74***	−15.65***	−11.88**	−2.90	−11.6***	−20.9***	−1.52
			(3.18)	(3.44)	(5.85)	(4.88)	(3.21)	(3.88)	(3.29)
Merged × 2000	—	—	−8.84**	−18.21***	−14.87**	11.66	−2.67	−4.68*	9.64*
			(4.18)	(3.60)	(6.63)	(8.41)	(2.56)	(2.68)	(5.32)
Merged × 2001	—	—	−15.82***	−14.00***	−15.99**	−12.93*	4.28	−3.65	−20.5***
			(3.42)	(3.70)	(6.30)	(6.62)	(2.99)	(3.40)	(5.25)
Merged × 2002	—	—	−18.80***	−16.04***	−19.44***	−17.23**	−1.61	−3.33	−5.08
			(4.02)	(4.68)	(4.79)	(7.67)	(2.68)	(3.82)	(3.32)
Merged × 2003	—	—	−20.61***	−17.57***	−22.26***	−22.75***	−0.49	−5.24	−9.16***
			(4.14)	(4.90)	(5.81)	(7.71)	(2.32)	(4.92)	(2.92)

(continued)

Table 2. (continued)

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	1998 Cohort	1999 Cohort	2001 Cohort	1998 Cohort	1999 Cohort	2001 Cohort
Dependent Variable			Real Administrative Expenditures per Capita (CDN)				Annual Change in Real Administrative Expenditures per Capita (CDN)		
Merged × 2004	—	—	−29.10***	−24.92***	−33.28***	−31.96***	−2.58	−5.37**	−8.83***
			(4.80)	(5.78)	(5.51)	(7.68)	(2.37)	(2.29)	(2.86)
Merged × 2005	—	—	−28.61***	−22.51***	−29.43***	−33.26***	3.65*	5.53*	−3.74
			(4.97)	(6.31)	(5.60)	(7.20)	(2.11)	(3.17)	(3.00)
Merged × 2006	—	—	−33.04***	−26.93***	−32.52***	−37.16***	−2.29	−2.41	−7.20***
			(5.27)	(6.41)	(6.50)	(7.85)	(2.24)	(2.39)	(2.15)
Merged × 2007	—	—	−36.37***	−34.86***	−37.68***	−42.03***	−0.39	−1.43	−4.18*
			(5.33)	(6.20)	(6.64)	(7.79)	(2.13)	(2.51)	(2.52)
Merged × 2008	—	—	−40.58***	−38.19***	−44.00***	−45.02***	−1.29	−3.24	−1.44
			(5.68)	(6.98)	(7.07)	(7.90)	(1.93)	(2.72)	(3.08)
Merged × 2009	—	—	−42.70***	−40.60***	−48.51***	−47.93***	1.20	−1.67	−2.65
			(6.53)	(8.05)	(9.41)	(8.27)	(2.89)	(3.28)	(3.09)
Merged × 2010	—	—	−46.47***	−42.65***	−50.10***	−53.93***	1.61	0.88	−5.91**
			(7.13)	(8.76)	(8.58)	(8.70)	(1.89)	(4.27)	(2.69)
d_1996	—	—	−1.64	−1.39	−1.37	−1.61	—	—	—
			(1.20)	(1.24)	(1.25)	(1.20)			
d_1997	—	—	−5.07***	−4.57***	−4.53***	−5.02***	0.91	0.91	0.90
			(1.78)	(1.74)	(1.74)	(1.79)	(1.17)	(1.17)	(1.17)
d_1998	—	—	−5.13**	−4.50**	−4.44**	−5.04**	1.92	1.92	1.91
			(2.04)	(2.06)	(2.06)	(2.06)	(1.31)	(1.31)	(1.31)
d_1999	—	—	0.03	0.73	0.81	0.17	6.75***	6.75***	6.74***

(continued)

Table 2. (continued)

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	1998 Cohort	1999 Cohort	2001 Cohort	1998 Cohort	1999 Cohort	2001 Cohort
Dependent Variable				Real Administrative Expenditures per Capita (CDN)			Annual Change in Real Administrative Expenditures per Capita (CDN)		
			(2.46)	(2.66)	(2.67)	(2.48)	(1.52)	(1.52)	(1.52)
d_2000	—	—	3.16	3.89	3.99	3.36	7.08***	7.08***	7.07***
			(2.57)	(2.72)	(2.72)	(2.58)	(1.44)	(1.44)	(1.45)
d_2001	—	—	3.43	3.92*	4.05*	3.67*	4.95***	4.95***	4.95***
			(2.11)	(2.26)	(2.27)	(2.13)	(1.56)	(1.56)	(1.57)
d_2002	—	—	8.44***	8.87***	8.86***	8.63***	6.28***	6.30***	6.31***
			(2.88)	(2.89)	(2.87)	(2.88)	(1.28)	(1.28)	(1.28)
d_2003	—	—	13.39***	14.16***	14.17***	13.61***	9.40***	9.41***	9.41***
			(3.08)	(3.20)	(3.19)	(3.07)	(1.25)	(1.25)	(1.24)
d_2004	—	—	24.62***	25.52***	25.54***	24.88***	11.14***	11.15***	11.15***
			(4.08)	(4.16)	(4.14)	(4.07)	(1.17)	(1.17)	(1.17)
d_2005	—	—	27.05***	28.02***	28.06***	27.37***	5.18***	5.19***	5.19***
			(4.28)	(4.37)	(4.35)	(4.27)	(1.22)	(1.22)	(1.22)
d_2006	—	—	34.01***	34.60***	34.66***	34.37***	8.97***	8.98***	8.99***
			(4.62)	(4.76)	(4.75)	(4.62)	(1.27)	(1.27)	(1.27)
d_2007	—	—	39.49***	39.15***	39.16***	39.56***	7.26***	7.27***	7.29***
			(4.69)	(4.91)	(4.89)	(4.66)	(1.10)	(1.10)	(1.10)
d_2008	—	—	48.43***	47.09***	47.02***	48.20***	7.82***	7.82***	7.86***
			(4.86)	(5.13)	(5.12)	(4.85)	(1.11)	(1.12)	(1.12)
d_2009	—	—	55.75***	54.99***	54.95***	55.67***	7.73***	7.74***	7.76***
			(5.75)	(6.00)	(5.99)	(5.74)	(1.09)	(1.09)	(1.10)

(continued)

Table 2. (continued)

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	1998 Cohort	1999 Cohort	2001 Cohort	1998 Cohort	1999 Cohort	2001 Cohort
Dependent Variable				Real Administrative Expenditures per Capita (CDN)			Annual Change in Real Administrative Expenditures per Capita (CDN)		
d_2010	—	—	62.59***	62.02***	62.01***	62.58***	6.10***	6.10***	6.13***
			(6.33)	(6.54)	(6.54)	(6.32)	(0.95)	(0.95)	(0.95)
share_young_1995	—	−5.81	−3.95	−3.16	−2.33	−3.49	−0.09	−0.05	−0.06
		(3.71)	(3.47)	(3.68)	(3.91)	(3.85)	(0.08)	(0.07)	(0.07)
Δ_share_young		0.41	−0.18	0.95	1.00	0.09	0.12***	0.12***	0.10**
		(0.71)	(0.96)	(0.73)	(0.75)	(0.91)	(0.04)	(0.04)	(0.04)
share_elderly_1995	—	1.92	2.34	3.48	4.12	2.73	0.03	0.06	0.02
		(2.48)	(2.38)	(2.57)	(2.85)	(2.87)	(0.06)	(0.06)	(0.06)
Δ_share_elderly		−1.09***	−0.00	1.88**	1.91***	−0.02	0.09**	0.07*	0.02
		(0.41)	(0.31)	(0.73)	(0.73)	(0.29)	(0.04)	(0.04)	(0.03)
Ln_pop_1995	—	−30.32***	−29.05***	−29.80***	−31.67***	−28.51***	1.01***	1.17***	1.12***
		(5.16)	(4.96)	(5.35)	(5.51)	(5.49)	(0.30)	(0.29)	(0.27)
pop_growth	—	−6.78***	−3.21**	−4.97***	−4.75**	−2.97**	−0.29**	−0.29*	−0.25**
		(2.32)	(1.50)	(1.89)	(1.94)	(1.50)	(0.14)	(0.15)	(0.11)
Ln_pop_density_1995	—	−7.15*	−5.28	−5.78	−6.77	−7.10*	−0.53***	−0.58***	−0.58***
		(4.07)	(3.46)	(3.93)	(4.35)	(4.10)	(0.14)	(0.13)	(0.13)
Ln_income_1995	—	52.61	50.10	54.46	63.81*	49.58	−1.26	−1.44	−1.53*

(continued)

Table 2. (continued)

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample	Full	Full	Full	1998 Cohort	1999 Cohort	2001 Cohort	1998 Cohort	1999 Cohort	2001 Cohort
Dependent Variable				Real Administrative Expenditures per Capita (CDN)			Annual Change in Real Administrative Expenditures per Capita (CDN)		
		(33.99)	(31.83)	(34.53)	(37.79)	(35.77)	(0.88)	(0.88)	(0.83)
d_und3000	—	41.95***	40.44***	40.67***	35.20**	46.66***	0.99	1.31*	1.30**
		(13.28)	(11.97)	(13.80)	(15.16)	(14.60)	(0.65)	(0.67)	(0.64)
d_ovr100000	—	93.69***	89.50***	85.28***	78.26***	83.14***	0.50	−0.50	−0.75
		(20.60)	(19.96)	(19.78)	(19.93)	(21.75)	(1.46)	(0.95)	(0.93)
_cons	110.59***	−92.99	−132.59	−209.55	−314.23	−142.38	5.63	4.87	7.30
	(6.54)	(382.40)	(361.67)	(388.66)	(433.53)	(413.58)	(10.83)	(10.92)	(10.26)
Observations	2,648	2,637	5,279	4,423	3,927	4,151	4,146	3,681	3,891
R^2	.047	.436	.434	.463	.459	.438	.050	.060	.066
No. of municipalities	331	331	331	277	246	260	277	248	262
No. of amalgamated municipalities	101	101	101	48	16	30	48	16	30

Note. Coefficients are unstandardized and standard errors are in parentheses. All models are calculated with ordinary least squares with robust standard errors clustered by municipality.
*$p < .1$. **$p < .05$. ***$p < .01$.

expenditures are Can$16 per capita lower among amalgamated municipalities than nonamalgamated municipalities even before the reforms. The coefficient for *post* estimates the general trend in administrative expenditures over time and indicates that administrative expenditures increased by Can$46 per capita from 1995 to 2010. This is consistent with descriptive accounts of the added administrative burdens that municipalities faced in the years following the provincial realignment of local services (Siegel 2009). The interaction of these variables, *Merged* × *Post*, provides the estimated average treatment effect. It indicates that amalgamation caused a reduction in administrative expenditures of Can$38 per capita. Statistical controls are added in model 2. They absorb nearly all of the initial group difference and lower the estimates for the effect of time and the average treatment effect, but only slightly, and both remain highly statistically significant, while improving model fit greatly. The coefficients for the controls indicate that administrations costs are indeed higher in very small and very large municipalities, as expected, and in municipalities with higher average household incomes. Administration costs are also lower in large, growing urban areas and decline with population growth.

Yearly Estimates

The addition of yearly indicators and interaction terms in model 3 somewhat sharpens the emerging picture. The yearly measures of the effect of time indicate that administrative expenditures rose steadily during the study period. A similarly clear linear trend is evident in the yearly estimates of the average treatment effect, with amalgamation causing seemingly steady reductions in administrative expenditures that amount to Can$46 per capita by 2010. Upon closer inspection, however, the linear trend in the estimated treatment effect is puzzling. From 1995 to 1997, the estimated effect of amalgamation is very small and statistically insignificant, as only a few municipalities elected to voluntarily participate in the province's restructuring program. In 1998, however, when the first forced amalgamations were implemented (including the largest, the City of Toronto) and municipalities were coerced to propose their own amalgamations, the treatment effect is negligible. Amalgamation effects first emerge in 1999 (−Can$11), following the second wave of amalgamations. Then, in 2000, the treatment effect shrinks slightly to −Can$8.8. Thereafter, the yearly treatment effect estimates show incremental, cumulative increases, with the most notably large jump occurring in 2004. This, too, is puzzling, as it is not obvious why amalgamated municipalities should continue to harvest scale economies several years after amalgamation.

Subperiod Estimates

One reason why the estimated effects of amalgamation do not closely follow the established timeline is that the Ontario amalgamations were not implemented all at once, but instead were staggered over several years, with nearly all of the mergers occurring in three distinct waves. Of the 102 amalgamations in this study, 48 were implemented in 1998, 16 in 1999, and 30 in 2001. To better examine the causal relationship between amalgamation and administrative expenditures, each of these three cohorts is examined separately. The specification is the same as used in model 2, except that the treatment group is defined as only those municipalities amalgamated in that year. The control group remains unchanged.

The separate analyses of the three main waves of amalgamations bring further clarity. Models 4, 5, and 6 report the estimated effects of amalgamation on administration expenditures for municipalities that merged in 1998, 1999, and 2001, respectively, with the highlighted cells in each column indicating the treatment effect for the year of amalgamation. A strikingly clear pattern emerges. For each cohort, the estimated treatment effects reveal a large increase in administration costs in the year prior to amalgamation that is statistically significant or nearly so (2001 cohort), which either disappears entirely in the amalgamation year (the 1998 and 2001 cohort) or is replaced by a decrease in expenditures (1999). Within two years of amalgamation, the treatment effect is large and statistically significant in all three groups, with amalgamation leading to average per capita reductions in administrative expenditure levels of Can$14 to Can$19 dollars. Again, for all three groups, the treatment effect steadily increases throughout the remainder of the study period.

Subperiod Estimates Using an Alternative Outcome Measure

The timing of the treatment effect is more precisely identified in models 7, 8, and 9. These alternative specifications are separate analyses of the 1998, 1999, and 2001 amalgamation cohorts, respectively. The regressions are identical to those in models 4, 5, and 6, except that the dependent variable is the annual *change* in administrative expenditures per capita rather than the *level*, and that 1996 serves as the base year, as data from 1994 were unavailable and thus the change in spending could not be calculated for 1995. The logic here is that if amalgamation is causing administration costs to fall, then it should be observable not just in the changes to annual levels of administrative spending, but also in the changes to the annual growth of administrative expenditures (Blom-Hansen, Houlberg, and Serritzlew 2014). It also provides a useful robustness check on the results of models 4, 5, and 6.

The results of models 7, 8, and 9 further confirm that administrative spending spikes significantly in the year prior to amalgamation: the estimates are Can$8, Can$13, and Can$10 per capita for the 1998, 1999, and 2001 cohorts, respectively. These increases are more than offset by decreased spending in the first year of operations for both the 1999 (−Can$21) and the 2001 (−Can$21) cohorts. Savings do not materialize for the 1998 cohort until the second year of operations (−Can$12). For the 1999 and 2001 cohorts, the treatment effect becomes much smaller for the next five years of operations, but remains negative. For the 1998 group, the treatment effect appears exhausted after the first year. Thus, the effect of amalgamation on administration costs can be observed in both the level of administrative expenditures and in annual changes to administrative spending, though the latter analysis suggests that the effects are mostly concentrated in the first few years of operations.

Estimates Using a Continuous Treatment Variable: Amalgamation Size

Considered together, the results of the regression analyses displayed in Tables 1 and 2 provide compelling evidence that amalgamation causes the cost of local administration to fall. What is less clear, however, is the extent to which those savings are the result of the newly formed municipalities capturing economies of scale, or the other operational changes occurring as a result of the reforms. If the cost-savings are driven by scale economies, then the savings should vary in accordance with the size or scale of the amalgamation.

Table 3 investigates the effect of amalgamation size on administrative expenditures. The specifications of the basic two-period model (model 2) are retained, with two important exceptions. First, the estimations include a continuous treatment variable. In the previous models, a binary treatment variable was used, which assumes that amalgamation has the same effect on administrative costs, regardless of whether the amalgamation involved several municipalities or only two and whether it resulted in a large increase in jurisdiction size or only a modest one. A continuous treatment variable, in contrast, captures how the treatment effect varies among amalgamated municipalities, as well as between amalgamated and nonamalgamated municipalities. In Table 3, two continuous variables are used. The first and most precise variable is a measure of the *proportional population increase* resulting from amalgamation, as developed in Foged (2016). Specifically, it is calculated by measuring the increase in population from the weighted mean population of the merging municipalities to the total population of the

Table 3. The Effect of Amalgamation Size on Administrative Expenditures.

Model No.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Real Administrative Wages per Capita (CDN)						
Merged	−11.16	—	—	−20.93**	−38.95**	−24.70	−21.95
	(8.92)			(10.41)	(16.48)	(31.48)	(20.64)
Proportional population increase	—	−1.40	—	7.66	—	12.81	9.73
		(4.73)		(4.85)		(38.04)	(8.19)
No. of municipalities merged	—	—	−1.67	—	10.36**	—	—
			(2.95)		(5.21)		
Merged × post	−35.58***	—	—	−29.77***	−28.09***	−21.27*	−15.95
	(4.98)			(6.60)	(9.13)	(12.07)	(10.56)
Proportional population increase × post	—	−19.08***	—	−4.53	—	−19.56	−10.73**
		(2.88)		(3.38)		(15.62)	(4.27)
No. of municipalities merged × post	—	—	−11.55***	—	−2.90	—	—
			(1.65)		(2.92)		
post	46.11***	43.42***	45.34***	46.22***	46.31***	46.32***	45.91***
	(4.63)	(4.43)	(4.65)	(4.64)	(4.67)	(4.68)	(4.98)
_cons	−228.79	−244.88	−235.48	−236.85	−248.34	−161.18	−381.53
	(377.28)	(383.20)	(380.08)	(376.64)	(376.93)	(403.68)	(433.70)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Average effect	−35.58	−25.76	−32.46	−35.89	−36.24	−35.94	−36.99
Observations	2,573	2,573	2,573	2,573	2,573	2,197	2,203
R^2	.452	.444	.447	.453	.453	.455	.454
No. of municipalities	323	323	323	323	323	276	276
No. of amalgamated municipalities	94	94	94	94	94	47	47

Note. Coefficients are unstandardized, and standard errors are in parentheses. All models are calculated with ordinary least squares with robust standard errors clustered by municipality.
*$p < .1$. **$p < .05$. ***$p < .01$.

new municipality, with the weights equal to the merging municipality's population as a fraction of the total population of the new municipality. Thus, it measures the overall size of an amalgamation, relative to the initial population sizes of the municipalities being amalgamated, with those populations weighted according to their share of the new municipality's total population.[11] Nonamalgamated municipalities are coded as 0. The second continuous treatment variable is a straightforward count of the number of municipalities involved in a given merger, with nonamalgamated municipalities again coded as 0.

The second important difference between the estimations in Tables 2 and 3 is that the latter excludes eight amalgamated municipalities from the panel on the basis that they were amalgamations of both the upper- and lower-tier municipalities. In these cases, it is not possible to distinguish between the scale effects of the "horizontal" mergers of the lower-tier municipalities with the scope effects that might result from the "vertical" merging of the two levels of municipal government. Thus, any estimates of the effect of amalgamation size on administrative expenditures are likely to be biased. All eight excluded municipalities were formed through very large amalgamations by any measure, involving between 6 and 22 municipalities. With these municipalities excluded, the panel includes 323 cases, 94 of which are amalgamated. Of these 94 amalgamated municipalities, there are 45 amalgamations of 2 municipalities, 26 of 3, 19 of 4, and 4 of 5, which results in an average of 2.81 municipalities per amalgamation, and a mean proportional population increase of 1.35.

The first column of Table 3 shows the estimated average treatment effect of amalgamation using the same basic two-period specification as in Model 2, along with the restricted sample. The results show that excluding the 8 two-tier amalgamations does not significantly change the estimated effect of amalgamation on administrative expenditure levels: The treatment effect is essentially the same (Can$35 per capita), and there is no statistically significant initial differences between the groups. Thus, even when the large and complex two-tier amalgamations are excluded from the analysis, the conclusions drawn about the causal effect of amalgamation on cost of local administration continue to hold.

Columns 2 and 3 present the results of alternative specifications using continuous treatment measures of amalgamation size. In both regressions, the point estimate is negative, indicating that increasing amalgamation size does further lower administrative expenditures. When *proportional population increase* is used, the point estimate is −Can$19.08, indicating that as the relative increase in jurisdiction size rises, the cost of administration falls. As, on average, amalgamations involved a proportional population increase of 1.35

times the weighted average size of the amalgamating municipalities, the average effect of the proportional population size is −Can$26, which is considerably lower than the average treatment effect estimated in Model 1. When the *number of municipalities merged* is used, the coefficient is −Can$11.55, which is the estimated effect of increasing by one the number of municipalities involved in an amalgamation. As the average number of municipalities involved in a merger (in this sample) is 2.81, the average effect is −Can$32 per capita, which is larger than that estimated using the proportional population increase, but nevertheless smaller than the average treatment effect given by the binary variable. The continuous effect is therefore small in both specifications. Savings resulting from amalgamation appear to be more likely the result of administrative and operational changes than economies of scale.

Estimates Using Binary and Continuous Treatment Measures: Amalgamation and Amalgamation Size

Columns 4 and 5 present models that include both a binary amalgamation variable and a continuous amalgamation size variable. These are the preferred specifications, as they allow for a discrete effect as a municipality is amalgamated and a continuous effect as the relative size of the amalgamation increases, thus removing any interaction and correlation between the two effects. In both models, the initial group differences are large and persistent over time. The average group differences are calculated by combining the discrete group difference (the coefficient for *Merged*) with the mean continuous group difference (the coefficients for *Proportional Population Increase* and *No. of Municipalities Merged*, respectively), producing estimates of −Can$10 and −Can$9 per capita, respectively, which are similar to that given in the basic model (−Can$10). The estimated effect of time (the coefficient for *post*) and the effects of the statistical controls (calculated but not reported) are similarly consistent with the results of the basic model.

The results of both models show that the effect of amalgamation on administration costs is predominantly a discrete one that varies only marginally with the size of the amalgamation. When the relative increase in population size is measured, the discrete effect (−Can$30) is more than four times the size of the continuous effect (−Can$6) for the average amalgamated municipality. When the continuous measure is the number of municipalities being amalgamated, the continuous effect is larger (−Can$8) but not statistically significant.[12] If the sample is broadened to include the 8 two-tier amalgamations, the point estimates of the continuous effects are about halved and lose all statistical significance.

The estimates above suggest that amalgamation size only accounts for about one-quarter of the average cost-savings resulting from amalgamation. Why does amalgamation size have such a small effect on cost-savings? One possibility is that the effect of amalgamation size may not be directly proportionate; that is, the effect may be disproportionately greater among municipalities formed through large amalgamations than it is among municipalities created through smaller amalgamations. If so, the estimated average effect of amalgamation size will be misleadingly small for major amalgamations and misleadingly large for minor amalgamations. To investigate this possibility, columns 6 and 7 examine the effects of amalgamation and amalgamation size using subgroups of below- and above-median amalgamation sizes, respectively. Amalgamation size is measured using *proportional population increase*, as this is the more precise of the two continuous measures. Small amalgamations are defined as those falling below the median measure of amalgamation size (0.9735), and large amalgamations are defined as those above that point. Both models use the basic two-period model, with two-tier amalgamations excluded and the control group unchanged.

The results in columns 6 and 7 further support the conclusion that amalgamation size does have a causal effect on administration costs, particularly when the amalgamation at least doubles the relative average size of the merging municipalities. Even among smaller amalgamations, however, there is some limited evidence suggesting that increases to amalgamation size do further lower administration costs. In column 6, the point estimate for the amalgamation size effect among smaller mergers is large and negative (−Can$19.5), as is the amalgamation effect (−Can$21), but only the amalgamation effect is statistically significant. For the group of larger amalgamations, as shown in column 7, the amalgamation size effect estimate is also negative (−Can$11) but the standard errors are much smaller and it is statistically significant. The estimated effect of amalgamation is also negative (−Can$16) and statistically significant, which, when combined with the amalgamation size effect, yields an average effect of −Can$37. These scale effects account for about 57% of the average cost-savings in larger amalgamations, and about 55% of the cost-savings in smaller amalgamations, though the latter estimate is not reliable. Together, the results shown in Table 3 indicate that amalgamation size accounts for between one-quarter and one-half of the average savings in the cost of local administration.

Robustness Check: Estimates in Functional Service Areas

The preceding analysis only considers the effect of amalgamation on administration costs. It is natural to wonder whether amalgamation had similar

effects on the costs of producing municipal services (Blom-Hansen et al. 2016). Such questions are interesting in their own right, but they also provide a further robustness check on the foregoing results and interpretations. If amalgamation did have a similar effect on costs in other areas of municipal production-oriented services, such as roads or water services, then it casts doubt upon the conclusion that scale economies are driving the result, as there is little theoretical reason for similar scale economies to exist across distinctly different municipal functions. It would suggest that the findings are instead the result of opportunistic administrative reforms by senior local officials, or some other force exogenous to the model that caused administrative expenditures to diverge during this period. Table 4 investigates this question by examining the effect of amalgamation on annual per capita expenditures in three other municipal functions: fire services, parks and recreation, and public works. The data are also drawn from municipal financial returns and include only wages, salaries, and benefits. This omits capital and operating costs, which vary as a share of total expenditures among the different categories. In 2010, among all Ontario municipalities, employee wages accounted for only 31% of all municipal expenditures on public works in Ontario, which is much lower than the comparable figures for municipal administration (47%), parks and recreation (53%), and fire services (85%).

The results in Table 4 indicate that amalgamation had little effect on the cost of municipal workers in fire services, parks and recreation, or public works. In all three categories, the treatment effect estimates are very small and statistically insignificant. For parks and recreation, the estimate is actually positive. Although not reported, expanding the two-period models to include yearly estimates provides some additional insight. For parks and recreation, the yearly treatments effect estimates are mostly negative but very small until 2005, at which point they turn positive and remain so for the duration. In public works, the estimates are negative beginning in 2001. In both service areas, the standard errors for the yearly estimates are large and the confidence intervals all cross zero. For fire services, the treatment estimates are positive and are larger than the standard errors from 1998 to 2004, after which point they turn negative. The yearly estimations, then, provide some limited but suggestive evidence that amalgamation had mixed effects on the costs of fire protection, parks and recreation, and public works. Amalgamation caused expenditures on employees in parks and recreation to fall initially, but then rise; in fire services, the effect was precisely the opposite; in public works, costs mostly fell. That amalgamation had such minor and contradictory effects on expenditures in functional service areas supports the main results concerning its effects on administration costs. At a minimum, these weak results confirm that amalgamation did not lead to uniform cost-savings across separate

Table 4. The Effect of Amalgamation on Municipal Expenditures in Select Functions.

Dependent Variable (Real Municipal Employee Wages per Capita (CDN))	(1) Administration	(2) Fire Services	(3) Parks and Recreation	(4) Public Works
Merged	−0.53	−13.75***	−7.36	6.40
	(8.95)	(3.96)	(6.03)	(10.17)
Merged × post	−35.48***	−1.89	3.29	−2.38
	(5.03)	(2.44)	(4.16)	(7.20)
post	45.97***	17.31***	14.58***	61.56***
	(4.65)	(1.95)	(3.12)	(4.99)
Controls	YES	YES	YES	YES
_cons	−92.99	133.21	−630.69	991.02**
	(382.40)	(139.99)	(393.49)	(397.98)
Observations	2,637	2,130	2,230	2,630
R^2	.436	.402	.180	.309
No. of municipalities	331	284	290	331
No. of amalgamated municipalities	102	90	89	102

Note. Fire Services includes full-time firefighters and staff, such as volunteers/part-time firefighters. Parks and Recreation encompasses libraries, museums, and other cultural services. Public Works combines transportation (roads and transit) and environmental services (water, waste-water, and garbage). There are fewer observations for Fire Services and Parks and Recreation because not all municipalities directly produce those services. Upper-tier municipalities in Ontario, for example, have no assigned responsibility for fire protection, while many small municipalities rely on intermunicipal agreements with neighboring municipalities for fire services. Coefficients are unstandardized, and standard errors are in parentheses. All models are calculated with ordinary least squares with robust standard errors clustered by municipality.
*$p < .1$. **$p < .05$. ***$p < .01$.

and distinct areas of municipal responsibility when there is ample evidence that the costs of such services depend more on how services are produced over the territory than on the population size of the territory itself.

Conclusion

The central conclusion of this article is that increasing local jurisdiction size reduces the cost of local administration. This is supported by two key empirical findings. First, exogenous increases to municipal jurisdiction size in

Ontario led to lower municipal expenditures on administrative employees. On average, and using the most conservative estimate obtained, the cost-savings amounted to Can$34 per capita between 1995 and 2010. These are not trivial savings. For affected municipalities, they represent 30% of their average expenditures on administrative employees in 2010 and 7% of their expenditures on all employees. The savings materialized quickly. Expenditures rose slightly in the period between the announcement of the boundary change and its actual implementation, but then fell substantially in the initial two years of operations, with the bulk of the savings realized within a period of five years. The savings appear to be permanent. Indeed, the implied savings continue to grow incrementally over time. These estimates are in line with the results of recent studies of similar centrally imposed changes to municipal boundaries in Denmark (Blom-Hansen et al. 2014) and Israel (Reingerwertz 2012). By exploiting the unique features of the Ontario reforms, such as the staggered implementation of the amalgamations, and demonstrating the robustness of the results across different specifications, time periods, subgroups, and outcomes measures, this article greatly strengthens the causal claim that increases to jurisdiction size lower the cost of local administration.

Second, the relative size of the increases to local jurisdictions had a statistically significant, negative effect on municipal administrative employee wages. Relatively larger increases to jurisdiction size led to proportionately greater reductions in administrative expenditures. On average, the relative size of consolidation accounted for between 25% and 50% of the estimated cost-savings. This finding is the result of an empirical approach that allows comparisons both among amalgamated municipalities and between amalgamated and nonamalgamated municipalities, and also eliminates any correlation between the scale and reform effects of amalgamation. It is a conservative estimate, and alternative measures of consolidation size might suggest a larger effect. For now, however, these results provide perhaps the most convincing evidence to date that economies of scale exist in local administration and can be captured through consolidation.

For proponents of consolidation as a means to capture cost-savings, this study should constitute a mixed result. The main findings should reaffirm their conviction that larger units of local government can be administered more cheaply than smaller ones and assuage any concerns that cost-savings are ephemeral, giving way to long-run increases in spending as competition diminishes among local municipalities. Of course, the evidence presented here concerns only the cost of employing local administrators. It is possible that some savings might be lost—at least in the short term—to the capital costs of building new administrative quarters, disposing of old assets, and purchasing new IT systems; unfortunately, the data used here do not permit making such calculations. Savings may also

materialize more slowly in jurisdictions where municipal employees are afforded job security for a period following amalgamation, such as Australia or Japan. Even more importantly, however, the evidence presented here on municipal employees in functional line departments (i.e., fire protection, parks and recreation, and public works) should caution against any expectations that comparable savings can be achieved across municipal services. The results here concern the cost of the basic apparatus of local government: a local governing council, their support staff, and the senior managers, administrators, and staff members who advise them and carry out their policies.

Finally, it must also be emphasized that this study concerns only cost-savings, not efficiency per se; no attempt is made to control for changes in the quality of local administration. In Denmark, where pre- and postamalgamation citizen surveys were undertaken, there is some evidence that increasing jurisdiction size adversely affected the quality of local democracy by weakening citizens' trust in local governments, as well as their feelings of political efficacy (Hansen 2015; Lassen and Serritzlew 2011). And the electoral overrepresentation of the periphery in Denmark's amalgamated municipalities remains an ongoing concern (Jacobsen and Kjaer 2016). In Ontario, it is certainly possible that increasing local jurisdiction size lowered "citizen effectiveness," to adopt Dahl and Tufte's (1973, p. 21) well-known terminology, which may have been offset, in whole or in part, by increases in policy capacity. These are questions for future research. Fortunately, the quasi-experiments in jurisdiction size created by compulsory amalgamation programs, such as the one described here in Ontario, Canada, provide rare opportunities to examine the otherwise overwhelmingly complex relationships between size and the cost and quality of local democracy. As the results presented here demonstrate, increasing the jurisdiction size of local governments reduces the cost of local administration.

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Notes

1. In some jurisdictions, including Australia, the emphasis has recently shifted to include the impact of amalgamation on financial sustainability (Dollery, Kortt, and Grant 2013).

2. This can be misleading when total populations and service levels are not closely correlated, as is the case for services that target segments of the local population, such as daycare services or programs for the elderly. This leads some scholars to prefer the term "economies of size" (Fox and Gurley 2006).
3. Statistics Canada. CANSIM Table 385-0037, Canadian government finance statistics, statement of operations and balance sheet for municipalities and other local public administrations, annual (dollars); Statistics Canada. CANSIM Table 384-0001, gross domestic product (GDP), income-based, provincial economic accounts, annual (dollars).
4. *Savings and Restructuring Act 1996*, S.O. 1996, c. 1.
5. *City of Toronto Act, 1997* (No. 2), S.O. 1997, c. 26.
6. *Fewer Municipal Politicians Act, 1999*, S.O. 1999, c.14.
7. In one case, where a regional government and its seven constituent municipalities were dissolved and replaced by two single-tier municipalities, data from the two single-tier municipalities are aggregated together to form a single postamalgamation observation.
8. Ontario municipalities are required to submit annual financial information returns to the Ministry of Municipal Affairs and Housing. These reports provide the expenditure data used in this article. Specifically, the data are taken from operating expenditures for salaries, wages, and employment benefits under the category of "general government." This includes elected politicians and their staff, senior managers, general administrators, and clerical staff working outside of traditional line departments. From 1995 to 1999, the data are found in *Schedule 4: Analysis of Revenue Fund Expenditures* (Line 0101). From 2000 to 2010, the data are found in *Schedule 40: Revenue Fund Expenditures* (Line 0299).
9. The year 1995 is chosen as the base year, as it was the last year that municipalities could not have known or anticipated the provincial reforms; the year 2005 is the first year in which all amalgamations in the study sample had been completed.
10. Unfortunately, a comparable measure cannot be calculated for household income, due to the data aggregation strategy used here and to census changes.
11. For example, if a town with 10,000 persons merged with a town of 5,000 persons, their weighted mean population would be 8,333, and the relative increase in population from this weighted mean to the new population would be 6,667, and thus, the proportional population increase would equal 0.8. An alternative approach is to calculate a version of the Herfindahl index for each merger by summing the squares of each municipality's share of the new municipality's population (cf. Hansen, Houlberg, and Pedersen 2014). This captures the extent to which one or more large municipalities dominate a given merger. This is intuitively appealing, as scale economies in administration costs might be most easily harvested when large municipalities absorb much smaller neighbors, while making little to no changes in their administrative operations. A case study of three Ontario amalgamations suggests this very possibility

(Kushner and Siegel 2005). But the Herfindahl index is more straightforwardly a measure of merger complexity than it is of merger size, and so is not used here.

12. An alternative approach is to estimate the continuous treatment effects using a subsample of amalgamated municipalities. This yields slightly larger point estimates (that are nearly statistically significant) and average treatment effects: −5.4 and −Can$7.24 for *proportional population increase*, and −4.5 and −Can$12.6 for *No. of Municipalities Merged*. The preference here is to rely on the results obtained using the full sample of 323 municipalities.

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