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Intermunicipal cooperation, municipal amalgamation and the price of credit

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ABSTRACT

In many countries, local government size is increasingly thought to be insufficient to operate efficiently. Two possible solutions to this problem are amalgamation and intermunicipal cooperation. This paper applies a novel methodology to shed light on the efficiency implications of this choice. Using a unique and rich micro-level dataset, we find that intermunicipal organisations (IOs) in the Netherlands consistently pay higher interest rates than municipalities, while there is no economic reason to do so. We interpret this as a form of inefficiency. Municipal amalgamation, on the other hand, does not result in higher interest rates. Our analysis eliminates one possible explanation, dispersed ownership of IOs, as the number of partners cooperating in an IO does not affect interest rates (no 'law of $1/n$'). This leaves the introduction of extra hierarchical layers as a result of cooperation, and the ensuing reduction in monitoring, as the most probable explanation.

1. Introduction

In many countries, local governments are believed to have a suboptimal size for offering public services efficiently, because of scale economies and because of spending spillovers. That is especially true in countries where amalgamation is rare or non-existent or where substantial public tasks have been decentralised recently. Local government can increase operating scale through amalgamation, through cooperation with other local governments and by contracting out to, or partnering with, private operators that also work for other local governments. Each of these options may have very different implications. *Contracting out* requires a competitive market, which does not exist for many services for which local government is responsible. Results have often been disappointing (Bel, Fageda, and Warner 2010). The

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same goes for public–private partnership (Andrews and Entwistle 2010). This paper focuses on amalgamation and cooperation.

Amalgamations often lead to public resistance because communities fear loss of autonomy or identity. Larger jurisdictions may be less able to tailor local services to local demand (Oates 1972). Moreover, amalgamation is a blunt instrument. Services offered by municipalities are quite heterogeneous. While for some (e.g., capital intensive) services they might operate under economies of scale, for other services the opposite may be true. Hence, increasing scale across the board could invoke efficiency gains in some public services and efficiency losses in others. In addition, amalgamation may result in more bureaucracy.

Intermunicipal cooperation offers municipalities a way to increase scale of production for selected public services only, while continuing to provide other public services on a municipal level, and preserving local autonomy. Although intermunicipal cooperation is a widespread phenomenon (Hulst and Van Montfort 2007), its effects on efficiency have not been extensively studied.

Cooperation may allow municipalities to exploit economies of scale (Bel, Fageda, and Mur 2013), but it may also have effects that reduce efficiency. Corporate governance theory predicts that cooperation exacerbates agency costs and reduces the intensity with which the activities of public servants are monitored. A control system combining monitoring with sanctions and rewards (henceforth referred to as 'monitoring') is needed to align public servants' objectives with those of citizens. Agency theory suggests three possible reasons for reduced monitoring, and, as a result, less efficiency, in intermunicipal organisations (IOs). First, an extra tier in the hierarchy is introduced: the board of the IO. Adding hierarchical layers increases monitoring costs. Monitoring could be further hampered by the fact that the municipal governments' grip on an IO is weaker than that on their own organisation. In addition, intermunicipal cooperation in effect creates a common pool. When a particular municipality puts a lot of effort into monitoring an IO, much of the ensuing efficiency gain will benefit other participants. As a result, the level of monitoring is likely to be lower than that for the operations of the municipality itself. As this disincentive to monitor is a result of the existence of a common pool, its strength will depend on the size of this pool.

Empirical studies of intergovernmental cooperation often focus on determinants of cooperation (e.g., Feiock, Steinacker, and Park 2009; Hefetz and Warner 2011, Rodrigues, Tavares, and Araújo 2012). Studies on the effects of intermunicipal cooperation are mostly case studies or survey studies (e.g., Henderson 2015). Bel and Warner (2015) survey the literature, and find just eight econometric studies of the effect of cooperation on public service costs or spending. All of these study solid waste services, one of them in

combination with water, electricity and gas. Results of these studies are mixed. Frère, Leprince, and Paty (2014) find no effect of cooperation on total spending of French municipalities.

The results of econometric studies on the effects of municipal amalgamations, carried out in several European countries and in Israel, are mixed as well (see Allers and Geertsema, forthcoming and the references therein). In the United States, neither city–county consolidation nor city–city consolidation seems to result in significant efficiency gains (Leland and Thurmaier 2010; Gaffney and Marlowe 2014).

Empirical studies of the effects of cooperation or amalgamation often focus on spending levels. Higher spending does not necessarily point to increased inefficiency, however. Efficiency depends on the ratio of output (or outcome) over input. Higher spending may simply reflect rising public service levels, leaving efficiency unaffected. Empirical studies in this field suffer from two fundamental problems (Geys and Moesen 2009). The scarce output indicators that are available are sometimes only crude proxies for the true level of public good provision. Moreover, such studies rely on strong assumptions (e.g., regarding the cost function), or they are vulnerable to data errors (if they use data envelopment analysis). Because all previous papers on the effects of intermunicipal cooperation focus on a service, waste, for which output is easy to quantify, the first problem does not necessarily apply to them. Indeed, output and quality are controlled for in some of these studies (e.g., Bel and Costas 2006; Zafra-Gómez et al. 2013).

Our approach is completely different from that of previous studies. Whereas previous studies on the effects of intermunicipal cooperation cover all costs of providing a single service, we focus on a single cost in a broad range of public services. We exploit a unique and rich micro-level dataset on the price both municipalities and IOs pay for a standard commodity: credit. We compare interest rates on loans to Dutch IOs, amalgamated municipalities, and municipalities that were not amalgamated. The credit risk for these loans is identical (i.e., zero). On identical loans, municipalities and IOs should be able to get the same terms. Thus, any systematic differences in interest rates would point *ceteris paribus* to differences in efficiency, without having to rely on strong assumptions inherent in the approaches chosen by previous studies.

We find that IOs pay higher interest rates than municipalities, while there is no economic reason to do so. We also find that the benefits of lower interest rates outweigh the extra bargaining cost they would require by a wide margin. Consequently, we interpret the higher interest paid by IOs as a form of inefficiency. However, the number of participating municipalities does not affect the interest rate paid by an IO. Thus, it is cooperation as such that results in higher interest rates, not the number of parties involved. This

leaves the introduction of extra hierarchical layers as a result of cooperation and the limited influence of municipality governments on IO boards as the most probable explanations.

2. Institutional background

Municipalities and intermunicipal organisations

Dutch municipalities are democratically governed jurisdictions with a broad set of responsibilities. Municipalities often cooperate to perform specific tasks, ranging from refuse collection to administering social welfare benefits. Cooperation is often aimed at reaping economies of scale. Other reasons to cooperate are that some municipalities are simply too small to perform every task independently, or that the catchment area of a public service exceeds the municipality's boundaries.

Dutch IOs cannot levy own taxes. In some cases, a grant is received from the central government, but most of their resources come from the participating municipalities. There are no limitations with respect to the number of cooperative arrangements, and municipalities are free to choose different partners for each (except for some cases where cooperation is mandatory, e.g., for fire brigades). The Joint Provisions Act enables municipalities to create *public bodies*, which are separate administrative entities that may employ staff, own assets, borrow money, etcetera. In case of financial distress, the participating municipalities are liable. Public bodies do not default. Municipalities may also create *public companies* under private law. Unlike public bodies, public companies can default, in which case shareholding municipalities lose their investment and creditors (part of) their claim. This does not happen often. In practice, municipalities occasionally bail out financially troubled public companies they participate in.

Municipalities are free to leave a public body or terminate their participation in a public company. In practice, however, this is not an easy step. The public services in question must then be provided by the municipality itself, or a different IO is to be joined. That may not always be feasible. Moreover, breaking up requires that all partners agree on a division of property and debt. There are no general rules for this.

Apart from these two main forms of cooperation, several other, looser types exist, e.g., foundations and informal communities of government officials in charge of specific public services. An alternative to intermunicipal cooperation is municipal amalgamation.

Almost every year, some Dutch municipalities are amalgamated. Amalgamation may be voluntary or mandatory, depending on the case (see Allers and Geertsema, forthcoming). The number of municipalities gradually decreased from 572 in 1997 to 408 in 2013. With over 40,000

inhabitants on average, Dutch municipalities are large compared with those in other countries (Allers and Geertsema, forthcoming).

Local government borrowing

There are no legal limits to the amounts municipalities or IOs can borrow (Allers 2015). There is no default risk associated with loans to municipalities. Dutch municipalities never go bankrupt, and neither do intermunicipal public bodies. The Financial Relations Act stipulates that a municipality may apply for a supplementary grant if revenues are significantly and structurally insufficient to cover necessary outlays. Bailouts occur often enough to be credible for potential lenders: 10 times in 1998–2014 (Allers 2015). This explicit bailout guarantee enables Dutch municipalities to borrow cheaply.

Unlike public bodies, public companies sometimes go bankrupt, although this happens rarely. Some of the loans to such companies are guaranteed by local governments. Non-guaranteed debt of public companies does carry credit risk, and is excluded from this study.

Most local governments borrow from banks; some of the bigger municipalities may hold loan auctions or issue bonds. Two Dutch banks specialise in loans to local governments, BNG Bank and NWB Bank. Apart from these banks, of which all shares are held by the central government and subnational governments, municipalities and IOs may borrow from commercial banks.

3. Theory and practice of risk-free credit

Theory

Both for municipalities and for public bodies, default risk is zero. Thus, there is no theoretical reason for banks to require different interest rates for loans to municipalities and to public bodies. For public companies, default risk is positive, but credit risk is zero, as their debt is guaranteed by default-free municipalities. However, some legal or administrative costs might be incurred in case a loan guarantee needs to be enforced, despite the official legal mechanisms in place for such situations. As a result, loans to public companies might carry more interest than those to public bodies and municipalities.

Practice: lending

Interest rates are not determined solely by the rate of return the bank requires; they are the result of negotiations between lenders and borrowers.

We interviewed representatives of BNG Bank on the way interest rates are determined.

The bank builds a so-called pricing yield curve by first connecting the funding interest rates for different maturities, based on a formal term structure model, and then adding surcharges for profit and cost (which may depend on principal and maturity), a liquidity premium (if applicable) and a surcharge for cost of capital ('usage of balance sheet'). The exact formula and its parameters are the result of a highly formalised administrative decision procedure that needs approval from the executive board. Before the start of every business day, current interest rates are fed into the system which then automatically provides the bank's client desk with the pricing yield curve.

The purpose of the loans included in this study is immaterial to the bank as credit risk is zero. Moreover, municipalities usually do not borrow for specific projects. Rather, the municipality's treasurer reviews the entire capital needs of his or her organisation and borrows accordingly. Such loans are not lines of credit, though: the principal is lent and paid back according to the agreed amortisation schedule.

Actual interest rates are a result of negotiations, usually by telephone or email, between the bank's client desk and the borrower. For the client desk, the pricing curve is exogenous and serves as a reference. It may offer lower rates than this curve suggests in order to attract extra business on days with ample supply, or when the interest rate on the international market has gone down during the day (recall that the pricing yield curve is calculated before the start of every business day). Borrowers aware of the latter are likely to secure better deals than borrowers who do not spend time to collect market information. BNG Bank's client desk for risk-free loans consists of four persons, who share a single office. Three of them were at this client desk during our entire research period; one of them joined it during our research period. Each of them is able to follow negotiations carried out by his or her colleagues. Each of them arranges loans for both municipalities and IOs.

This setup ensures that, on the part of the bank, both types of borrowers are treated in the same way, by the same persons, following the same procedures and using the same pricing curve. Any systematic differences in risk-free interest rates between municipalities and IOs are likely to originate from the borrowers' behaviour. Borrowers can obtain somewhat lower interest rates by negotiating well. This requires some general knowledge about credit markets, up-to-data information about current market conditions, and time.

Practice: borrowing

Figure 1 describes the decision making process of borrowing money by municipalities and IOs. Ultimately, municipalities and IOs serve their citizens.
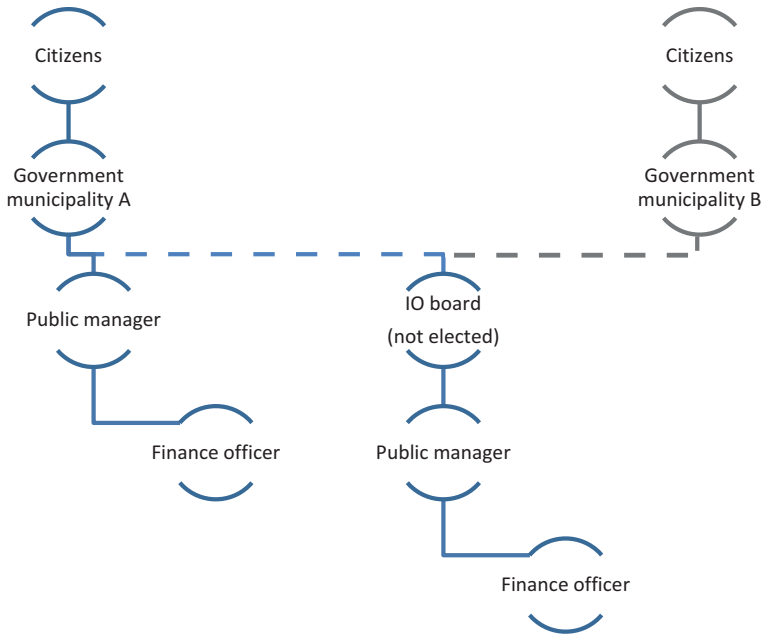
Figure 1. Decision-making authority with respect to local government borrowing.

Citizens periodically vote to re-elect or dismiss the municipal government. *Ceteris paribus*, higher costs (e.g., higher interest rates) result in higher local taxes or less public services. Both diminish the local governments' re-election chances (Allers 2012), which provides an incentive to operate efficiently. The municipal government delegates day-to-day operations to management, which supervises the finance officer who arranges loans.

In the case of IOs' borrowing, there is an additional link in the chain of command: the general board of the IO. Note, however, that this relationship is not as hierarchical as Figure 1 might suggest, and that it is shared with other municipalities. Its strength may depend on the legal form of the IO. A *public body* is governed by a general board containing members of municipal councils or aldermen from the participating municipalities. It is the general board, not the councils of the participating municipalities, that adopts the public body's budget. This budget determines how much participating municipalities contribute. The municipal councils may express their views on the proposed budget, but they have to accept the public body's board's decision and authorise payment of the budgeted contributions.

The board managing a *public company* operates even more independently: it enjoys almost complete autonomy vis-à-vis local government (Hulst and Van Montfort 2007). The board may (partly) consist of

representatives of the participating jurisdictions, but they must act in the interest of the company and are not accountable to the municipal councils.

4. Theory and hypotheses

The delegation of decision-making authority introduces the problem that, due to asymmetric information and divergent interests, agents will not automatically act in the best interests of their principals. Figure 1 shows in effect a series of principal–agent relationships, with the citizen as principal, the finance officer as agent, while elected officials and public managers act both as principals and as agents. Agency theory assumes agents to have a negative utility for effort and a positive utility for money. It describes how a control system of monitoring, sanctions and rewards (referred to as 'monitoring') is needed to align the agent's objectives with those of the principal (e.g., Fama and Jensen 1983). In our case, monitoring applies to the oversight on finance officers who arrange loans, but also on public managers, who are responsible for hiring competent finance officers; etc. Less monitoring will result in less effort by the agent.

Optimal monitoring requires trading off costs and benefits. Adding an additional hierarchical layer increases monitoring costs while leaving benefits unaffected. This suggests that persons arranging IO loans are monitored to a lesser extent than those arranging municipalities' loans; the same applies to their bosses (Figure 1). A second reason to expect less monitoring is the fact that the municipal governments' grip on the IO's board is weaker than the grip on its own staff, which raises monitoring costs. IOs operate with a considerable degree of independence, and financial problems are ultimately shifted to the participating municipalities.

To make matters worse, agency theory suggests an additional problem: dispersed ownership (Sørensen 2007). Public services provided through IOs are financed from a common pool; hence, the costs are shared with other municipalities. Consequently, when a municipality decides on the amount of effort (cost) that should be put into monitoring an IO, it will take into account that any efficiency gains from putting in that effort will only partly benefit the municipality itself, since they will be shared with all other participants (free rider problem). This is likely to result in a level of monitoring that is lower than that for the operations of the municipality itself.

The public choice literature, however, provides a different perspective, assuming that citizens are unable to effectively oversee their elected representatives. This allows politicians to collect rent: they can divert public resources to further their own goals, e.g., to improve their chances of being re-elected. In our case, it could be attractive for politicians to obtain campaign contributions from banks in exchange for higher interest rates on

loans. Decision making in IOs is further removed from politicians than decision making in municipalities, and more different politicians are involved. As a result, it is more difficult for a particular politician to exploit the organisation's resources and transaction costs are higher (Sørensen 2007). This could result in lower interest rates for IOs.

Thus, theoretically, intermunicipal cooperation may result in lower efficiency because of reduced monitoring (agency theory), and to higher efficiency because of less political meddling (public choice). The net effect is uncertain. Marvel and Marvel (2007), using US data, found that the level of monitoring for services provided by other governmental organisations is lower than that for the operations of the municipality itself. We expect the same for our case. Here, political meddling seems to be less relevant than in other settings. As a publicly held company, BNG Bank never makes donations to politicians or organisations involved in campaigns. Indeed, the only donations BNG Bank makes are to the BNG Culture Fund, an independent organisation, which donates to cultural projects selected by experts in the field. This arrangement, and the small amount available for distribution (one million euro per year, while there are over 400 municipalities), make political interference in interest rates on loans from BNG Bank very unlikely. Thus, we hypothesise that intermunicipal cooperation reduces monitoring effort and therefore leads to higher interest costs.

Hypothesis 1: IOs pay higher interest rates than municipalities on equivalent loans.

Higher interest rates paid by IOs would not necessarily point to inefficient borrowing practices. Because public companies can go bankrupt and municipalities and public bodies cannot, lenders could charge the former higher interest rates in order to cover possible legal or administrative costs of enforcing a loan guarantee. Then, higher interest paid by public companies would not be the result of inefficient borrowing practices. Defaults of public companies are exceptional in the Netherlands. Moreover, officials of BNG Bank whom we interviewed told us that the costs of retrieving a loan in such a case are negligible.

Hypothesis 2: Public companies do not pay higher interest rates than public bodies.

If Hypothesis 2 is accepted, we conclude that IOs could pay less interest. However, this would require more effort (collecting market information; negotiating). Only if the benefits of putting in this extra effort exceed the costs can we conclude that IOs borrow inefficiently.

Hypothesis 3: Benefits of extra bargaining effort by IOs would exceed costs.

Accepting hypotheses 1, 2 and 3 would suggest that IOs borrow inefficiently. The question then arises why that would be the case. As described above, agency theory suggests three possible reasons for reduced monitoring, and, thus, less efficiency in IOs: the introduction of extra hierarchical layers, the limited influence of municipality governments on IO boards; and dispersed ownership of IOs.

We test the validity of the last explanation by investigating whether interest rates increase with the number of participants in an IO. Several papers argue that inefficiency due to common pool effects increases with the number of participants, a phenomenon called the 'law of $1/n$' (Weingast 1979; Primo and Snyder 2008). In the case of a particular municipality putting effort into monitoring an IO, the share it receives of the gains from that effort are proportional to $1/n$.

Although empirical findings supporting the law of $1/n$ exist in several contexts (e.g., Baqir 2002), some authors have raised questions. Primo and Snyder (2008) give examples of cases where a 'reverse law of $1/n$' may hold. This is in line with Tornell and Lane (1999), who model a situation where each participant has an outside option. This means that, for the most efficient organisation as well as for others, participating must be at least as attractive as leaving. As n goes up, inefficiency must be curbed to satisfy that condition. As municipalities are free to join or leave IOs, this model may be relevant here.

The public choice literature also supports a 'reverse law of $1/n$'. It predicts that decision making in IOs is more efficient because it is further removed from politicians than within municipalities. As the number of participants grows, it gets more difficult for an individual politician to exploit the organisation's resources, as transaction costs are higher.

Thus, theoretically, a higher number of cooperating municipalities may result in lower efficiency because of reduced monitoring, but also in higher efficiency because of less political meddling and because participants have an outside option. The net effect is uncertain. Earlier in this section we argue that, in our case, political meddling seems to be less relevant. Moreover, as explained, in the Dutch case there are several barriers to leaving an IO. Therefore, we hypothesise that the first effect dominates.

Hypothesis 4: The interest rate paid by IOs increases with number of participating municipalities (i.e., the 'law of $1/n$' holds).

Accepting Hypothesis 4 implies that dispersed ownership (partly) explains why IOs pay higher interest rates than municipalities.

Amalgamation might also affect monitoring effort. Amalgamation is an arduous process that may have severe disruptive effects on managerial behaviour and organisational outcomes, e.g., because of poor staff morale, loss of managerial expertise due to increased turnover, and work overload (Andrews and Boyne 2012). On the other hand, amalgamation might have a beneficial effect on efficiency. Existing organisations usually have well established ways of doing things, which might have become outdated. Amalgamation forces organisations to reconsider procedures and operations, possibly resulting in more efficient practices (Hansen, Houlberg, and Holm Pedersen 2014). Again, the net effect is uncertain. We hypothesise that the first, efficiency-reducing, effect dominates, but that it is smaller than for cooperation:

Hypothesis 5a: After amalgamation, municipalities pay higher interest rates than not (recently) amalgamated municipalities.

Hypothesis 5b: Interest rates paid by recently amalgamated municipalities are lower than those paid by IOs.

5. Method and data

Our units of observation are individual loans. We have data on four types of loans with fixed interest rates made by BNG Bank, which is the market leader in this field:

(1) Short-term loans (up to 1 year); principal and interest are due at maturity.
(2) Long-term loans where amortisation and interest is paid in equal instalments (annuity).
(3) Long-term loan where the principal is paid back in equal instalments (linear).
(4) Long-term loans where the principal is paid back at maturity (bullet).

Purchase or sale of loans, refinancing before maturity is reached, restructuring, consolidation of loans and loans with no fixed interest rate or standard amortisation schedules are left out of our dataset. Refinancing at maturity is included. We select loans to municipalities and public bodies, and loans to public companies which are guaranteed by municipalities. All loans in our sample are officially free of credit risk.

Interest rates vary a lot over time and over amortisation schemes. In order to compare interest rates of different loans, we relate them to reference interest rates that apply to the same dates and amortisation schedules. Our

dependent variable is the interest rate differential (IRD), defined as the relative difference between the actual interest rate r_j on loan j and the reference interest rate r_{ref}: $IRD_j = \frac{r_j - r_{ref}}{r_{ref}}$. By using a relative measure, we automatically control for macro-economic factors influencing interest rates. The IRD may be interpreted as follows: if, e.g., IOs have an average IRD that is 0.05 higher than that of municipalities, then, other things being equal, they spend 5% more on interest payments.[1]

We use the interest rate indicated by BNG Bank's pricing yield curve as the reference interest rate. As explained, this reference rate is exogenous to the staff manning the bank's client desk. For long-term loans, reference rates based on the bank's pricing yield curve are available for the most common maturities only: both 5 and 10 years for bullet loans, 5, 10, 15, 20 and 25 years for loans with linear amortisation and 10, 15, 20 and 25 years for loans with annuity amortisation. We select loans for which reference rates are available, and exclude loans with less common maturities from our main analysis. We also exclude outliers (observations with an IRD above 0.25 or below −0.25). An extensive sensitivity analysis shows that these choices do not affects results (see supplemental data).

We have data for 1997–2013. For short-term loans, however, data is available for 2006–2013 only. For each loan, we have data on the identity of the borrower and on the loan characteristics that influence interest rates. In our regressions, we use principal, maturity, market volatility and forward start (number of days between contract and start of the loan) as controls, and we run separate regressions for different amortisation schedules. Market volatility is measured as the coefficient of variation of the reference interest rate in the previous ten business days. In order to allow for non-linearity, we also include the square of these variables. Furthermore, we include year dummies to control for nationwide factors influencing IRDs.

Data taken from the bank's administration are combined with data we collected through a survey of IOs: number of participating municipalities, field of activity and legal form. These characteristics are subject to change over time (see also Gradus, Dijkgraaf, and Wassenaar 2014). We define number of partners as equal to 1 in case of loans to municipalities and equal to the number of participating municipalities for loans to IOs.

We use two dummy variables for amalgamation: one indicating whether a municipality has been amalgamated in the year of the loan or up to 3 years before, and one indicating whether it has been amalgamated 4–8 years before the loan was made. Thus, we can distinguish short run effects from long-term effects of amalgamation.

Table 1. Summary statistics.

	(1) N	(2) Mean	(3) Standard deviation	(4) Min	(5) Max
Entire sample					
Interest rate	11,301	2.093	1.922	0.050	6.820
Principal (million euro)	11,301	7.665	12.25	0.091	278.495
Maturity (years)	11,301	5.972	8.411	0	25
Forward start (days)	11,301	25.32	129.4	0	2,193
Number of partners	11,301	1.543	2.400	1	35
Volatility	11,301	0.012	0.009	0.001	0.088
IRD	11,301	−0.012	0.084	−0.250	0.250
IOs					
Interest rate	994	1.684	1.561	0.090	5.620
Principal (million euro)	994	4.911	8.273	0.010	66.086
Maturity (years)	994	3.782	6.502	0	25
Forward start (days)	994	15.59	74.20	0	923
Number of partners	994	7.178	5.539	2	35
Volatility	994	0.012	0.010	0.001	0.088
IRD	994	0.027	0.072	−0.248	0.250

Table 1 presents descriptive statistics. Our dataset contains 11,301 observations, of which 10,307 are loans to 433 different municipalities, and 994 are loans to 113 different IOs. In those 113 IOs, 389 different municipalities participate, ranging from very small to very large.

6. Empirical results

Do IOs borrow inefficiently?

Table 2 shows regressions of IRDs on a dummy that takes the value of one if the loan was made to an IO, and on a number of control variables.[2] The first column includes all loans in our dataset. Columns 2–5 concern specific types of loans. In many cases, the control variables are highly significant, especially for long-term loans which are more heterogeneous than short-term loans. Overall, the included variables explain differences in IRDs quite well.

We now turn to the central question of this paper: do IOs pay higher interest rates than municipalities? The answer is quite straightforward. The coefficients of the IO dummy are positive and highly significant for all loan types. IOs pay 3–5% more interest on equivalent loans. This confirms Hypothesis 1 (see Figure 2).

Higher interest rates paid by IOs do not necessarily point to inefficient borrowing practices. Recall that public companies can (and sometimes do) go bankrupt and public bodies cannot. Thus, lenders might want to charge the former higher interest rates in order to cover costs associated with enforcing loan guarantees in case of default. In that case, the higher interest paid by public companies would not be the result of inefficient borrowing practices. One might even argue that our result that IOs pay higher interest rates may be driven partly or wholly by this reason. We now test Hypothesis

Table 2. Regressions of interest rate differential (IRD): basic analysis.

	(1) All loans	(2) Short term	(3) Annuity	(4) Linear	(5) Bullet
IO	0.0432***	0.0475***	0.0464***	0.0271***	0.0438***
	(0.00405)	(0.00536)	(0.00981)	(0.00329)	(0.00836)
Principal (million euro)	−0.000815**	−0.000869*	−0.000855	−0.000607***	−0.000609**
	(0.000398)	(0.000502)	(0.000778)	(0.000155)	(0.000244)
Principal squared	3.21e-06	3.32e-06	2.55e-05	6.25e-06***	3.44e-06
	(3.02e-06)	(3.35e-06)	(2.23e-05)	(2.05e-06)	(3.75e-06)
Maturity (years)	−0.00201***	−0.00544	−0.00886***	0.00191***	
	(0.000559)	(0.0138)	(0.00293)	(0.000658)	
Maturity squared	5.99e-05***	0.00394	0.000248***	−5.52e-05***	4.04e-05
	(1.72e-05)	(0.00863)	(8.27e-05)	(1.88e-05)	(4.41e-05)
Volatility	0.464	0.582*	0.289	0.775***	0.806
	(0.297)	(0.350)	(1.624)	(0.206)	(0.633)
Volatility squared	3.707	3.801	7.457	−18.72***	−26.97
	(6.810)	(7.658)	(56.88)	(5.128)	(16.55)
Forward start (days)	0.000208***	0.00176	0.000212***	0.000194***	0.000338***
	(1.38e-05)	(0.00142)	(1.47e-05)	(1.38e-05)	(4.43e-05)
Forward start squared	−5.93e-08***	−5.34e-05	−6.76e-08***	−4.57e-08***	−2.06e-07***
Observations	11,301	6,822	306	3,673	500
R-squared	0.210	0.165	0.717	0.697	0.678

Robust standard errors in parentheses. Year dummies included.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

2, stating that interest rates paid by public companies are not higher than those paid by public bodies.

Table 3 presents regression results for IOs only. As extra control variables we add dummies representing the fields in which IOs are active.

Table 3. Regressions of IRD of IOs.

	(1) All loans	(2) Short term	(3) Annuity	(4) Linear	(5) Bullet
Legal form: public body	0.00241	0.00297		0.00609	
	(0.0120)	(0.0139)		(0.0125)	
Inverse of number of partners (1/n)	−0.0318	−0.0172	−0.658	−0.0146	0.0176
	(0.0384)	(0.0590)	(5.101)	(0.0272)	(0.101)
Field: welfare provision	−0.0220	−0.0165	0.0891	−0.0548***	
	(0.0186)	(0.0208)	(0.972)	(0.0136)	
Field: work provision for disabled	−0.00725	0.00472	−0.0384	−0.0348***	−0.0227
	(0.00944)	(0.00996)	(2.907)	(0.0108)	(0.0271)
Field: environmental services	0.00840	0.0246**	0.0996	−0.0184	0.0253
	(0.0105)	(0.0100)	(0.997)	(0.0138)	(0.0478)
Field: public health	−0.00656	−0.0151		−0.0150	0.0746
	(0.0130)	(0.0241)		(0.0159)	(0.0743)
Field: public safety	−0.0103	−0.00711	−0.153	−0.0371***	−0.0377**
	(0.0142)	(0.0213)	(1.718)	(0.0118)	(0.0152)
Field: business development	0.0119	0.0136			−0.0219
	(0.0184)	(0.0202)			(0.0213)
Observations	889	631	25	197	36
R-squared	0.098	0.084	0.959	0.408	0.978

Robust standard errors in parentheses. Controls (see Table 2) and year dummies included. Observations where legal form is unknown are excluded.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

That is because in some fields, a particular legal form or number of participants is more prevalent than in others. The control variables concerning individual loan characteristics (shown in Table 2) are included as well, but we do not report their coefficients. Our dataset does not contain any annuity or bullet loans to public companies (see Table A1 in the supplemental data), which explains the blanks in those columns. For short-term loans and for linear loans, the coefficient of the dummy variable public body is close to zero and far from significant. That means that we observe no difference in interest rates compared with public companies. Thus, we cannot reject Hypothesis 2. IOs pay higher interest rates while there is no economic reason to do so.

Thus, presumably, IOs could pay less interest, but no doubt this would require more effort (collecting market information; negotiating). Only if the benefits of putting in this extra effort exceed the costs (Hypothesis 3) can we conclude that IOs borrow inefficiently. A simple calculation can put this into perspective. For IOs in our sample, average loan size is 4.9 million euro and average interest rate 1.7% (Table 1). Thus, yearly interest paid on the average loan is 83,000 euro. Paying 3–5% more in interest means paying 2500–4000 euro more annually. Over 3.8 years (average maturity, Table 1) that amounts to 10,000–15,000 euro per loan (present value, calculated using average interest rate in sample). Assuming wage costs of 100,000 euro (which is generous) and 228 working days per year (the Dutch average), 10,000 euro buys 23 days of staff. Thus, spending an extra couple of hours or even days in order to secure a lower interest rate would be a very profitable investment. Hypothesis 3 is supported. IOs borrow inefficiently.

Is dispersed ownership part of the explanation?

Agency theory suggests three possible reasons for reduced monitoring, and, as a result, less efficiency in IOs: the introduction of extra hierarchical layers as a result of cooperation, the limited influence of municipality governments on IO boards; and dispersed ownership of IOs (common pool problem). If dispersed ownership would contribute to inefficiency, we would expect interest rates to increase with the number of participants in an IO (Hypothesis 4). This is tested in Table 3. In our dataset, the number of participants (n) varies from 2 to 35 (Table 1). In order to directly test the 'law of $1/n$', we include $1/n$ in the regressions. In each column, the coefficient is far from significant.

Thus, our evidence does not support the 'law of $1/n$'. This implies that it is cooperation as such that results in higher interest rates, not the number of parties involved.

Table 4. Regressions of IRD on cooperation and amalgamation.

	(1) All loans	(2) Short term	(3) Annuity	(4) Linear	(5) Bullet
IO	0.0426***	0.0464***	0.0482***	0.0271***	0.0438***
	(0.00421)	(0.00563)	(0.00926)	(0.00331)	(0.00835)
Amalgamated 0–3 years before	−0.00312	−0.0113	0.0141	0.00138	0.000783
	(0.00586)	(0.00982)	(0.00998)	(0.00124)	(0.00439)
Amalgamated 4–8 years before	−0.00455	−0.00764	0.000849	−0.000354	−0.000157
	(0.00480)	(0.00780)	(0.00456)	(0.00144)	(0.00348)
Observations	11,301	6,822	306	3,673	500
R-squared	0.210	0.166	0.720	0.697	0.678
Only municipalities that participate in IOs included in regressions					
IO	0.0400***	0.0438***	0.0532***	0.0267***	0.0441***
	(0.00471)	(0.00638)	(0.00952)	(0.00328)	(0.00910)
Amalgamated 0–3 years before	0.00108	−0.00566	0.0209*	0.00165	1.90e-05
	(0.00709)	(0.0109)	(0.0121)	(0.00138)	(0.00624)
Amalgamated 4–8 years before	−0.00393	−0.00650	0.00236	0.000336	0.00493
	(0.00559)	(0.00839)	(0.00522)	(0.00188)	(0.00386)
Observations	8,711	5,405	233	2,735	338
R-squared	0.213	0.173	0.760	0.690	0.666

Robust standard errors in parentheses. Control variables (see Table 2) and year dummies included.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Effect of amalgamation

We now investigate whether amalgamation affects interest paid by munici-
palities. In Table 4, the regressions in Table 2 are extended with two
amalgamation dummy variables. The coefficient of none of these is signifi-
cant for any of the loan types. Municipal amalgamation does not affect IRDs,
neither in the short run nor in the long run. Using a different cut-off for our
amalgamation dummies, or using or a linear amalgamation variable instead
(number of years since amalgamation), does not change our conclusions
(not reported).

Thus, Hypothesis 5a, which states that amalgamation temporarily
leads to higher interest rates, is rejected. Moreover, this confirms
Hypothesis 5b, that amalgamated municipalities have lower IRDs than
IOs (Figure 2).

7. Sensitivity analysis

It might be argued that the decision to cooperate may not be independent
of a municipality's efficiency. For example, efficient municipalities could be
less likely to cooperate because they already enjoy low costs, or more likely
to cooperate because they are more attractive partners. Then, we would be
comparing IOs, which comprise relatively (in)efficient municipalities, with a
group of both inefficient and efficient municipalities. As we have seen,
however, the IOs included in our database have participants from 389
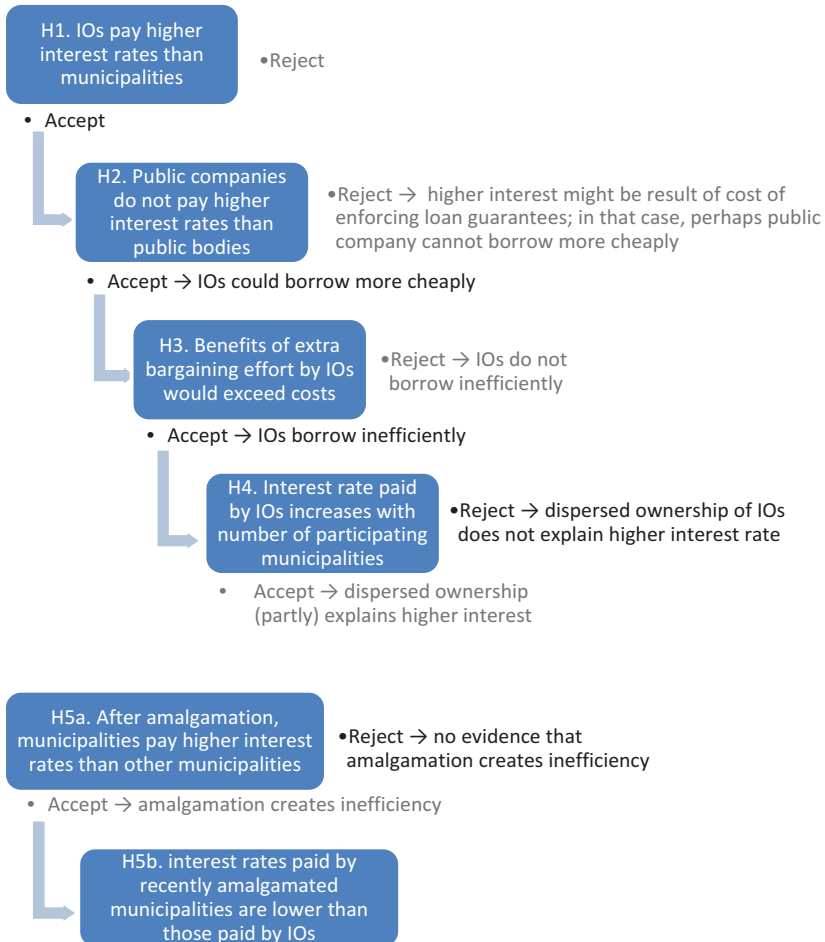
Figure 2. Summary of hypotheses tested.
Note: Test outcomes are printed in black, discarded options in grey.

different municipalities, while the total number of municipalities was 572 in 1997 and 408 in 2013. Thus, the majority of municipalities participate in the IOs we study. Still, as a robustness check, in the lower panel of Table 4, we include only municipalities that participate in at least one of the IOs we study. The results are very similar to those in the upper panel of Table 4.

Five additional sensitivity tests are detailed in the supplemental data. First, we re-run regressions, now including uncommon maturities for which no reference interest rates are available, using interpolated values for reference interest rates. Second, we use a random effects model instead of an ordinary least squares specification. Furthermore, we allow previously excluded outliers with an IRD above 0.25 or below −0.25 in our regressions, and apply different

thresholds. In addition, we test whether our results are driven by big munici-
palities able to secure cheap loans because of a superior bargaining position.
Finally, we check whether results are robust to our choice of control variables.
The sensitivity analysis shows that our results are quite robust.

8. Conclusions

Local government size is the subject of a lively debate. Municipalities
sometimes seem too small to be able to perform all tasks that are
nowadays expected from them, to benefit from scale economies, or to
avoid interjurisdictional spillovers. Such problems may be addressed
through national reforms, e.g., amalgamating small jurisdictions into
bigger ones, or promoting intermunicipal cooperation in fields where
scale matters most. In some cases, local governments operating on a
small scale can themselves make a choice between amalgamation and
intergovernmental cooperation. Ideally, the choice of jurisdiction size
and the extent to which local governments cooperate should be guided
by a comprehensive trade-off of costs and benefits. Efficiency effects
are, of course, only part of this trade-off. Many different aspects need to
be considered, e.g., the effect of jurisdiction size on the quality of the
democratic process (Denters et al. 2014). Still, efficiency is an important
subject, as many local governments struggle to make ends meet. This
paper applies a novel methodology to shed light on the implications of
intermunicipal cooperation and amalgamation for operating efficiency.

Econometric research on the effects of intermunicipal cooperation on
costs is scarce and focused on one particular service: solid waste collection.
We choose a different approach, comparing the price Dutch IOs, amalga-
mated municipalities and not-amalgamated municipalities pay for an iden-
tical commodity: risk-free credit. We find that IOs pay significantly higher
interest rates.

The higher interest paid by IOs cannot be explained by possible legal or
administrative costs associated with enforcing guarantees on loans to public
companies. That is because there is no significant difference in interest rates
on loans to public companies (which may default, but which borrow under
guarantee from the participating municipalities) and public bodies (which,
under Dutch law, cannot default). Thus, there is no economic reason why
IOs should be required to pay higher interest rates than municipalities.

Interest rates are the outcome of a bargaining process, which is costly. It
requires general knowledge about credit markets and up-to-date information
about market conditions. If the cost of extra bargaining effort would exceed
the benefit from somewhat lower interest rates, IOs would not be borrowing
inefficiently, even though interest rates could be reduced. We show, however,
that this is not the case. The benefits of lower interest rates outweigh the

extra bargaining cost they would require by a wide margin. Consequently, we interpret the higher interest paid by IOs as a form of inefficiency.

The outcome that cooperation reduces efficiency is consistent with agency theory, but not with public choice theory. Agency theory predicts that less monitoring of employees and managers reduces efficiency. There are three reasons to expect that monitoring of IO staff and operations is looser than in municipalities: the introduction of extra hierarchical layers as a result of cooperation, the limited influence of municipality governments on IO boards; and the fact that IOs are owned by a group of municipalities (dispersed ownership), which might create a free rider problem.

If it is dispersed ownership that drives our results, we would expect the number of partners in an IO to affect the interest rate. With more participants, a smaller part of any efficiency improvement benefits a particular municipality, reducing the incentive to put effort into monitoring the IO. However, we find that the number of participants does not affect the interest rate paid by an IO. Our outcomes do not support the 'law of $1/n$'. That does not necessarily mean that dispersed ownership does not create a free rider problem, however; there might be a different effect working in the opposite direction, leaving a zero net effect. For example, it might be necessary to curb inefficiency in IOs with more participants, to prevent the most efficient partners leaving the IO. Still, our result implies that it is cooperation as such that results in higher interest rates, not the number of parties involved. This leaves the introduction of extra hierarchical layers as a result of cooperation and the limited influence of municipality governments on IO boards as the most probable explanations. Attempts to improve IO efficiency may be targeted on these issues.

Amalgamation, we find, does not lead to higher interest rates. Not even in the short run, where one might suspect the amalgamating process to divert time and effort from operational processes.

Of course, interest is only one of many costs, and not the most important one. We use interest as an indicator, a 'canary in a coalmine', because controlling for individual loan characteristics enables a clean comparison between municipalities and a broad range of IOs. Further research is needed to investigate whether municipal cooperation creates inefficiencies that extend beyond paying higher interest rates. If higher interest costs in IOs are indeed caused by insufficient monitoring, as suggested by agency theory and our results, we would expect inefficiencies elsewhere in IOs, too. Such inefficiencies should be compared with possible gains resulting from economies of scale in order to determine the net effect of cooperation on efficiency. As noted, the results of previous studies of the effects of Intermunicipal cooperation are mixed. It would be interesting to apply our method to countries where these effects already have been studied in a different way, and compare the outcomes.

Notes

1. More precisely, if the IRD of IOs exceeds the IRD of municipalities by x, the former pay $x \frac{r_{ref}}{r_{municip}}$ as much in interest. That is because $IRD^{IO} = IRD^{municip} + x$ implies $\frac{r_{IO} - r_{ref}}{r_{ref}} = \frac{r_{municip} - r_{ref}}{r_{ref}} + x$. Rewriting yields $\frac{r_{IO} - r_{municip}}{r_{municip}} = x \frac{r_{ref}}{r_{municip}}$. As the average value of $\frac{r_{ref}}{r_{municip}}$ in our sample is 1.02, this factor will usually be negligible. Thus, if we find a difference in IRD of 0.05, that implies that 5.1% more is paid on interest ($0.05 \times 1.02 \times 100\%$).
2. Reported standard errors are robust for heteroscedasticity and for correlation between observations for identical organisations.

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