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Service quality and the optimum number of members in intermunicipal cooperation: The case of emergency primary care services in Norway

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Abstract

Intermunicipal cooperation (IMC) is often used as a mean to reap scale benefits. Most studies on the effects of IMC focus on cost savings, while service quality is overlooked. In this study, the focus is set on input quality in a service characterized by high asset specificity and need for redundancy: emergency primary care. We analyze how mode of governance affect performance by (1) measuring whether IMC versus single-municipal production affects input quality and (2) identifying optimum scale of operation; effect of the number of participants in the cooperation on input quality. The findings indicate that cooperation weakens the input quality of medical workforce, but that this negative effect is balanced out as the number of participants increases, indicating that cooperation needs to reach a certain size to achieve optimum scale of operation. Concerning equipment, both cooperation in general and an increasing number of participants decrease the input quality.

1 | INTRODUCTION

Intermunicipal cooperation (IMC) has been proposed by scholars as an organizational solution in situations with small-scale production for over half a century (Ostrom et al., 1961) and is used on a large scale by municipalities worldwide. Even so, the literature is still scarce and inconclusive when it comes to what effect cooperation has on a broader set of outcomes than purely cost savings (Aldag et al., 2020; Bel & Warner, 2015a, 2015b). Research on

outcomes representing service quality is particularly scarce, and mostly confined to the US context (Aldag et al., 2020). Aldag et al. (2020) even argue that costs savings due to cooperation are limited and shared municipal service delivery mainly should be considered a way to achieve better service quality or access to services. Still, systematic evidence on the relationship between IMC and quality is scant and "we need to identify better ways to measure them" (Aldag et al. 2020, p. 286).

Given the inconclusive results from research on the outcomes of IMC versus other modes of governance (Bel & Sebő, 2021; Bel & Warner, 2015b), more attention also should be given to different ways that IMCs are organized. One important organizational element is clearly the number of owners (i.e., municipalities) participating in the cooperation as this may create problems with dispersed ownership and multiple principals (Aldag et al., 2020; Bel et al., 2014; Bel & Sebő, 2021; Bel & Warner, 2015b; Blåka, 2017a, 2017b; Sørensen, 2007). It is thus not only a question of cooperating or not, but also a question of optimal number of governing actors and potential challenges with multiple principals (Voorn et al., 2019).

This study thus contributes to the research on outcomes of IMC by (a) comparing IMC with single-municipal production, (b) focusing on dimensions of service quality, and (c) investigating whether there is optimum number of members in IMCs in the field of emergency primary care (EPC) services in Norway. We do this by providing empirical evidence on to what extent IMC affects input quality, and how this effect may depend on the size of the cooperation and type of quality.

1.1 | IMC and service quality

The rationale for shared service delivery is mainly to pool resources and thus enhance performance (Bel & Warner, 2015a; Hulst & Van Montfort, 2007). Cooperation is thereby used as a tool to create scale benefits which means that the larger the production unit is, the more resources they may allocate to utilize and invest in important production factors such as equipment and competence (Williamson, 1985). While the decision to privatize mainly lies in the expectation to save cost, shared service delivery is also driven by concerns about service quality (Aldag & Warner, 2018; Bel & Warner, 2015a; Holzer & Fry, 2011; Warner & Hefetz, 2002). Levin and Tadelis (2010) suggest that an explanation for why cooperation is preferred over privatization is that governmental actors will be more concerned with quality than private contractors. Even so, studies that measure the effects of cooperation versus other modes of governance on service quality are scarce (Aldag et al., 2020; Bel & Sebő, 2021). To our knowledge, earlier research that study effects of cooperation on service quality is very limited. In the European context, Arntsen et al. (2021) show that small municipalities experience greater perceived service quality from cooperating in EPCs than larger ones. Blåka (2017b) shows that municipalities in IMCs with fewer members achieve better output quality than single municipalities and municipalities in IMCs with more members in fire services. Allers and Greef (2018) investigate whether the amount of spending on IMC affected service quality levels but do not find a connection between the two.

Traditionally, most measurement of service quality has revolved around customer or user perception of services in relation to expectations (Cronin & Taylor, 1992; Rowley, 1998). This type of quality measurement is widely used in the studies of both single-organizational (e.g., Jain & Gupta, 2004; Rowley, 1998) and interorganizational (Roehrich et al., 2020) performance.

For many public services that are highly professionalized, such as health care, subjective measures encounter severe challenges as it is difficult for citizens to evaluate (Blåka, 2017b; Kelly & Swindell, 2002; Rowley, 1998). Recent studies call for more objective indicators of service quality, specifically in EPC services (Arntsen et al., 2021). In this study, we narrow the focus to two objective indicators: access to *specialized equipment* and *work force*. These factors have traditionally been used as performance measurements and defined as a form of input quality (Kelly & Swindell, 2002; Rowley, 1998), indicating "what efforts the organization puts into the production" (Blåka, 2017b, p. 238). In an early discussion on production functions, Griliches (1957) pointed to the crucial importance of input

quality of capital and labor to explain differences in productivity between firms. Capital quality is usually measured in monetary units (price of equipment), while labor quality is measured most commonly through the experience and education of employees (Fox & Smeets, 2011). Rather than studying the price of equipment, we concentrate on the IMC's access to specialized equipment, in addition to access to a highly specialized workforce (nurses, doctors). This is a quite common way to measure input quality in health services/hospitals (Chen et al., 2019). Compared to customer or client perceptions of quality, more objective measures of input quality are by some argued to be a "… particularly fruitful future research avenue" for research on effects of interorganizational relations (Roehrich et al., 2020, p. 464). However, we are clearly aware of the fact that input quality is only one facet of service quality, and that total service quality is (at least) a function of input quality, process quality, and output quality (Donabedian, 1978).

1.2 | IMC, scale of production, and dispersed ownership

As already noted, the basic idea of IMC on service provision is to increase the production volume to obtain scale benefits. However, as Bel and Belerdas-Castro (2021 p. 5) points out, "the potential effects of cooperation (is) likely (to) differ across services, because the optimal scale is different for each one." This coincides with Hulst et al. (2009) who emphasizes that every service has an optimum scale of operation and Ostrom (1976) who argued that the appropriate scale may depend on the good considered. Empirical studies show that different services hold different optimum scales of operation, but we still lack research on a greater variety on service characteristics (Aldag et al., 2020; Blåka, 2017a, 2017b). Reaching a certain level of production is especially important for tasks characterized by *redundancy* and *asset specificity* (Williamson 1979, 1991, 1999). Asset specificity refers to what degree investments in capital goods (for instance, buildings, machines, helicopters, etc.) can be exploited beyond the specific service field (Brown and Potoski 2003, 2005). The lower possibility for use beyond the specific service, the higher the asset specificity. As an example, one can argue that asset specificity will be higher for fire services than auditing services as fire trucks have fewer alternative areas for use than computers used for accounting.

Redundancy refers to the level of excess capacity needed. Some services experience uncertain and fluctuating demand, raising a question on how to calibrate organizational resources. For organizations with a need for fail-safe service delivery, this question becomes accentuated. Some public services—such as fire services and emergency care—simply cannot fail, and municipalities will therefore need to provide capacity (capital goods and personnel) that on a regular basis will be "redundant" (Warner, 2011, p. 425). The organization's resources must be dimensioned to meet the accidental fire or the next large accident. Other services such as auditing services and solid waste disposal are in contrast characterized with more stable demand and with greater possibility to handle fluctuations by smoothing or spreading workload over a longer period.

The higher the asset specificity and demands for redundancy, the higher the potential scale benefits. For many municipalities, the only way to reach the optimal level of production is to cooperate with other municipalities. Thus, based on classic production theory, we should assume that service quality will increase as cooperation increases the production volume. And, based on transaction cost economics, these effects should be most significant for services characterized by high asset specificity and needs for redundancy.

Cooperation, however, activates another problem: multiple principals and dispersed ownership. In the framework of principal-agent theory (Fama & Jensen, 1983), shared service delivery requires at least two owner municipalities that act as principals. A recent review (Voorn et al., 2019) shows that multiple principals may lead to a variety of challenges such as goal incongruence (Young et al., 2002), problems with accountability (Schillemans & Bovens, 2011), poorer coordination, and weaker incentive schemes for agents, which again can impair performance (Bernheim & Whinston, 1986; Dixit, 2002; Martimort, 1992; Stole, 1997).

Agency theory also forms the benchmark model for corporate governance and dispersion of ownership (Fama & Jensen, 1983). The more concentrated ownership, the higher incentives to oversee company management, which

again are expected to enhance performance. Contrastingly, the more dispersed ownership the greater distance between owners and managers, again weakening each owner's overall responsibility and incentive to monitor performance. Owners may also have different interests, something that creates difficulties in reaching agreement on common goals and priorities (Sørensen, 2007, p. 1047). We can argue that this is an even greater issue in local governments than in privately owned organizations since political authorities exercise a more complex form of indirect ownership since it is delegated from citizens (Shleifer & Vishny, 1997). In a corporate governance view, the worst case is a combination of indirect and dispersed ownership—resulting in weaker performance than the hierarchical mode—which represents a concentrated ownership (Sørensen, 2007). Dispersion of ownership and thus problems of multiple principals have been found to affect performance negatively in IMCs by Garrone et al. (2013), Sørensen (2007), and Blåka (2017a, 2017b).

Detecting the optimal scale of public services—population size and dispersion (Deller, 1992; Ladd, 1992)—lies in the core of local government literature (Dixit, 1973; Hirsch, 1959; Oates, 1972). In this study, we hold these scale effects constant and focus on governance-related issues of cooperation. By using the framework of Fama and Jensen (1983), we ask whether cooperation will create multiple principal problems (hence Voorn et al., 2019) and if an increase in owners (principals) will increase this problem. We can infer two hypotheses based on this framework. First, the framework suggests that IMC weakens owners' incentive to prioritize and invest which in turn weakens performance and secondly, that the performance will be further weakened as more members that are included, leading to the following two assumptions:

H1. *All other things held constant, inter-municipal cooperative organizing will display lower service quality than purely municipal arrangements.*

H2. *All other things held constant, the negative effect of cooperation on service quality will increase with the number of members.*

1.3 | Study setting

Norwegian municipalities cooperate on a large variety of public tasks, including EPC (Monkerud et al., 2016). While the state is responsible for providing specialist health-care services, municipalities are responsible for providing primary health-care services, including EPC (Arntsen et al., 2020). A great local autonomy in organizing service provision results in substantial variations between municipalities when it comes to how local EPCs are organized (Arntsen et al., 2021; Morken et al., 2019). The great diversity in municipalities' size (ranging from approximately 200 to 800,000 inhabitants) combined with high local autonomy makes Norway a case where we may expect cooperation to have impact. In addition, Norway serves as a European case in a field where empirical work so far mostly stems from the United States (Aldag et al., 2020; Bel & Sebő, 2021).

Comparative studies across countries show diversity in how IMCs are formalized, varying from loosely coupled alliances to highly formalized companies with shared ownership (Blåka, 2017a, Bel & Warner, 5b, 2015a; Hülst & Montfort, 2012; Hulst & Van Montfort, 2007). European countries seem to choose more formalized organizational forms like standing joint organizations (with joint production and ownership) or contractual agreements (purchase and sale of services) than what is the case in the United States (Bel & Warner, 2015b).

The most widespread organizational form within shared EPCs (and for local shared health services in general) in Norway is the host municipality model. This is a contractual agreement where municipalities delegate the operational and administrative governance responsibility to one of the participating municipalities (Arntsen et al., 2020; Monkerud et al., 2016). Earlier mappings show that about 40% of all municipalities provide their EPC through a host model, while approximately 25% provide it through joint organizations (Monkerud et al., 2016). The EPCs provide medical assistance to all inhabitants either at the EPCs location or by driving out to the patient's location when the

General Practitioner (GP) office is closed. Thus, EPCs provide services at evening and night time at weekdays, and around the clock in weekends (Arntsen et al., 2020). EPCs are staffed with GPs that are employed in the member municipalities while other medical personnel such as nurses are employed directly at the EPC. The GPs work daytime in their respective municipal medical centers and are by their contracts obliged to also work part-time as doctors at EPCs (The Norwegian Directorate of Health, 2020). EPCs are thus in need of costly and transaction-specific medical equipment and highly trained professional personnel and are also characterized by redundancy due to uncertain demand (e.g., The Norwegian Directorate of Health, 2020; Tjerbo & Skinner, 2016). Furthermore, in Norway, there is a significant variation in both equipment and work force quality in emergency care services (Morken et al., 2019), but no studies of whether this is linked to the mode of governance or the size of a cooperation. This variation reflects that the state has less restrictive legislation here than, for example, for fire services who operate in a more regulated context. The laws regulating EPCs only specify minimum requirements, for instance that a certified doctor should be available, leaving great space for local variation above this minimum level. Concerning equipment, there are no specific regulations other than to be able to "conduct diagnostics and implement necessary medical treatment and surveillance in acute situations" (Regulation on EPC, § 9). The rather weak national regulation leaves great room for the use of local discretionary decisions and thus for variation between EPCs.

1.4 | Data

Our data are drawn from three main sources: (1) The National Out-Of-Hours Services Registry, which are managed by the National Centre for Emergency Primary Health Care in Norway which provided all data concerning emergency centers, (2) Statistics Norway, and (3) Fiva et al. (2017) who provided data for the instrument and control variables.

In contrast to many studies on the effects of IMC, this study does not focus on the municipal level and thus not on the effects of IMC for each municipality (Bel & Sebő, 2021). Instead, we study the service providing unit (like Pérez-López et al., 2018; Pérez-López et al., 2015, 2021; Pérez-López et al., 2016; Zafra-Gómez et al., 2020), regardless of whether is provided through interorganizational cooperation or by municipalities on their own (Provan et al., 2008). Keeping the analysis on this level is necessary to be able to compare eventual effects of different governance modes on input quality.

Keeping the analysis on the organizational level makes the quality measures directly comparable as there is no need to aggregate from the municipal level. Quality of work force is measured by an unweighted sum of dichotomous variables measuring what type of personnel (doctors, nurses, and other medical personnel) that is available at daytime, evening, and nighttime. The maximum score on this variable is 6 and the minimum is 0. The value of six indicates the highest quality level of the work force.

Quality of equipment refers to capital goods that are specific to the task at hand (Williamson, 1999). In the case of emergency care services, doctors and other medical personnel should have access to necessary medical emergency equipment. Every municipality have the responsibility to make sure medical personnel are equipped to respond to medical call outs, although—as noted—it is not specified in detail what equipment that must be available at each EPC (The Norwegian Directorate of Health, 2020). Ideally, as specified by the medical standards in the field, EPCs should have access to emergency car, driver, defibrillator, medications, radio terminal, tablet with access to patient information and the emergency center, and emergency uniforms. The equipment variable is measured as an unweighted sum of equipment that is available at the individual emergency care unit. Maximum score is 11, minimum 0, the higher the score the more equipment the center has. Even though the general development over time is that emergency centers are getting access to more of this equipment, there are still substantial variations (Morken et al., 2019). A challenge with using an unweighted index is that it does not consider the possible qualitative differences between the different types of equipment. When we have chosen to use an unweighted estimation, it is because the standards predefined by the medical field in EPC do not rank the different types of equipment in

relation to medical importance. Still, as the measure on personnel quality, the measure on equipment quality is rather crude.

Three variables measure different elements in the IMC. The first (governance mode) is a dichotomous variable measuring whether it is an IMC (1) or a single municipality (0). The second measures the number of members in the cooperation. This variable takes on the numerical value of 1 if it is a single municipality, and the maximum of 12 in this study, with a mean value of 3,5 members. Hulst et al. (2009) state that shared service delivery across Europe is characterized by great diversity. The organizations vary with respect to the number of participants and the number of services they provide. This is also the case in the Norwegian context. Leknes et al. (2013) show that in their mapping of 750 Norwegian IMCs, there exist great variations in number of members in each cooperation, spanning from 2 participants to nearly 50 members in the largest ones. Unfortunately, we have not been able to locate similar mappings on a European level.

The third (varying numbers) is a variable measuring whether the number of members is varying during the week. Some municipalities are only members of the emergency center during the weekends (Saturday and Sunday) or nighttime, while producing the services as a single municipality on weekdays. This is measured as a dichotomous variable taking on the value of 0 if the number of members is stable during the whole week, and 1 if it is varying.

1.5 | Control variables

Using panel data with data from three points in time allows us to control for individual characteristics of each emergency care unit, as well as for change over time. As quality will have direct consequences for costs involved in the service provision (higher wages for qualified personnel, higher price for high quality equipment), we include control variables known to affect eventual economic benefits of scale (Bel et al., 2014). First, the *population in the emergency unit's geographical* area is used as a proxy for production volume. We thus expect a clear and positive effect of population size on both access to equipment and work force. Second, *population density* is included. One may expect that IMCs with high dispersion may need greater input quality—and that densely populated localities may benefit from economies of density (Raknes, 2015). Third, *centrality* of the emergency center is included to account for the proximity of the emergency unit to other medical and care services at the regional level. It is assumed that emergency services located in the physical proximity of the regional center will have easy access to both equipment and personnel in their close vicinity, thus making it less necessary for the emergency center itself to invest in highly competent personnel and sophisticated equipment. Finally, we include *resource munificence* (Provan & Milward, 1995). Emergency centers are—by law—financed by municipalities as part of their core services. The amount of financial resources available for investments in input quality factors devoted to each emergency center will thus most probably depend on the general economy in the member municipalities.

For the control variables, data were aggregated from the municipal to the EPC level. For each EPC, the population is measured as the sum of the population in each of the member municipalities. As this variable is highly skewed toward small values, the variable was log transformed. We include inhabitants per square kilometer to measure the population density in the locality. As this variable contains the variable "area" used for instrumental purposes, we decided to center area (i.e., "mean area" minus "actual area") and use the centered term in the computation of the density variable. To measure each EPC's general economy, we use net operating profit as a percentage of gross operating revenues in each of the participating municipalities. This measures the resources municipalities have available for investments, something that is highly important to EPCs because their service level depends on their ability to invest in medical resources. To aggregate this number to the IMC level, each member percentage has been multiplied with its number of inhabitants and divided with the population of the cooperation as a whole.[1] The economy of the EPC area is thus weighed according to the population size of the participating municipalities. The higher this number is, the better the economy. We use colocation with hospital and colocation with ambulance as measurement of

possible colocation benefits and whether the county administration is located in the emergency center's area as a proxy for possible urbanization benefits (Aldag et al., 2020).

1.6 | Empirical strategy

All data for the emergency centers were measured for three periods (2014, 2016, and 2018). The control variables were lagged, and thus measured for 2013, 2015, and 2017. Two of the instrument variables have been constructed as the mean value from the years 1997–2007. The reason for the chosen time span is that cooperation has had its main growth over the past 30 years in Norwegian municipalities (Leknes et al., 2013). Table 1 displays the descriptive statistics for all variables used in the analysis.

The highest bivariate correlation is between "IMC" and "number of members" (Pearson's $r = 0.67$, significant at the .01 level), indicating low probability of collinearity. Full table of bivariate correlations is available from the authors on request.

The main objective of this study is to examine the potential relationship between governance forms of a specific public service (medical emergency services) on the input quality of this service. The general model to be tested is thus:

$$\text{InputQuality} = F(\text{mode of governance}, \text{IMC size}, \text{varying number}, \text{controls}) \quad (1)$$

Input quality is measured as two distinct components: quality of equipment (Q_1) and quality of work force (Q_2). Organization is measured as IMC or not (X_1), number of members in IMC (X_2), and varying membership or not (X_3). The controls are the economy of the member municipalities (X_4), the log transformed population in the member municipalities (X_5), the population density in the area covered by the emergency unit (X_6), colocation with hospital (X_7), colocation with ambulance services (X_8), and colocation with county administration (X_9). The empirical model to be tested is:

$$Q_{1-2} = a + \beta X_1 + \beta X_2 + \beta X_3 + \beta X_4 + \beta X_5 + X_6 + X_7 + X_8 + X_9 + e \quad (2)$$

The analysis is run as a panel analysis with fixed effects for emergency center and time (the xtivreg2 command in Stata 16.1). To determine whether a random effects model should be used, rather than a simple OLS regression we conducted a Lagrange Multiplier test (Breusch & Pagan, 1980). This test proved significant for both dependent variables indicating that a random effects panel model is appropriate. We then performed a Hausman test to investigate whether to use fixed or random effects. The Hausman test proved to be significant for one dependent variable (access to equipment), but not for the other (access to work force). We chose to run the analysis with fixed effects for all outcomes to make the results more comparable (running the analysis with a random effects model did not yield significantly different results). Even though the data consist of panel data over three periods, there is still a methodological concern of endogeneity. We assume that cooperation will affect input quality, but we cannot exclude the possibility that level of input quality may affect the decision to cooperate (Blåka, 2017a). To counter this problem, we implement an instrument variable approach using a two-stage least square regression. In the first stage, we regress the possible endogenous variables with a set of instruments. In the second stage, we insert the predicted values from the first-stage regression instead of the first-stage variables (Blåka, 2017a, p. 1099).

We rely on three instruments that jointly instrument for the possible endogenous independent variables. Our main rationale for the chosen instruments is grounded in the assumption that political variables mainly affect the decision to cooperate, and the size of the geographical area mainly affects the number of members included. The political variables are (1) Mayor from right-wing party. The transaction cost framework allows us to consider modes of governance as a continuum with different degrees of integration, reaching from hierarchy, which is the most integrated, through hybrid to market which is the least integrated mode of public service production (Williamson, 1991). While studies have shown that right-wing governments tend to be associated with private production (Bel et al., 2013, p. 442), we may argue that when it comes to the comparison between hierarchy and cooperation, leftist

TABLE 1 Descriptive statistics

	Source	Year of measurement	*N*	Mean	SD	Minimum	Maximum
Dependent variables							
Equipment	National Centre for Emergency Primary Health Care	2014, 2016, 2018	542	5.05	2.06	0	11
Work force			542	1.60	1.72	0	6
Independent variables							
IMC			542	0.55	0.50	0	1
Number of members			539	2.35	1.84	1	12
Control variables							
Varying number of members |(1 = yes)			542	0.09	0.29	0	1
Colocated with hospital			542	0.17	0.38	0	1
Colocated with ambulance			542	0.10	0.30	0	1
Net operating profit	Statistics Norway	2013, 2015, 2017	530	2.75	2.95	−3.61	21.3
Population (log transformed)			535	9.32	1.38	6.14	13.41
Population density			535	187.37	2449.62	0.30	54887.16
Input quality Work force	National Centre for Emergency Primary Health Care	2014, 2016, 2018	585	0.33	0.47	0	1
Input quality Equipment			585	0.33	0.47	0	1
County administration	Fiva et al. (2017)		543	0.05	0.17	0	1
Instrument variables							
Area (log transformed)	Statistics Norway	2018	533	6.84	1.20	2.28	9.16
Female Mayor	Fiva et al. (2017)	Mean 1997–2017	543	0.15	0.14	0	0.71
Mayor from right-wing party			543	0.51	0.28	0	1

governments are more prone to integrate public service delivery, while right wing-dominated governments are more in favor of hybrid or corporate ("business") organizational modes (Schoute et al., 2020). (2) Female mayor. Here, we base our hypothesis in more general leadership research. Glass and Cook (2018), in their review of the literature, point out that women leaders are more committed to inclusion and relationship building. This contributes to greater commitment to and awareness of the needs of various stakeholders. We thereby expect that this favors engagement in shared service delivery. (3) Geographical area. We expect that the larger the area covered by the ECS, the higher are the number of members since having a larger area to cover might trigger a higher need for collaboration.

The first stage results are not included in the paper for reasons of space but show that all instruments are statistically significant in the hypothesized direction (details upon request).

1.7 | Estimation results

Table 2 shows the results of step two of the instrumental analysis which uses the predicted values of the first-stage regression instead of the original cooperation variables. It is worth noting that mode of governance (IMC or single

TABLE 2 Empirical results from the estimation of the determinants of input quality

	Model 1: Quality of equipment	Model 2: Quality of work force[a]
IMC	−2.80 (1.6)*	−3.40 (1.3)***
Number of members	−0.28 (0.5)	1.07 (0.4)***
Varying number (1 = yes)	0.37 (0.4)	0.07 (0.3)
Colocated with hospital	−0.45 (0.4)	−0.23 (0.3)
Colocated with ambulance	−0.46 (0.4)	0.25 (0.3)
Net operational profit	0.05 (0.0)	0.01 (0.0)
Population (log transformed)	3.52 (1.3)***	0.87 (1.0)
Population density	0.00 (0.0)	0.00 (0.0)
Time 1	−1.01 (0.2)***	0.33 (0.1)***
Time 2	−0.69 (0.2)***	−0.03 (0.1)
Co-located with county administration	30.16 (10.2)***	19.83 (7.8)***
N	506	506
F-value (Anderson-Rubin Wald test)	3.18	4.06
Underidentification test (Anderson canon. Corr. LM statistic) Chi-sq(2)	62.711***	62.711***
Overidentification test of all instruments (Sargan statistic) Chi-sq(1)	2.388	2.028

[a]For robustness check, we also conducted the analyses including only doctors in the work force variable. This estimation showed the same tendency as the presented variable.*** indicates significance at 1% level, ** at 5% level and * at 10% level. In parentheses, robust standard errors.

municipality) and the number of cooperation partners are included in the same analysis, and should thus not be interpreted in isolation. The first variable (mode of governance) indicates the general effect of cooperation versus producing service within one municipality. The second variable—number of members—shows the effect of increasing the cooperation by one more member. To clarify these effects, we include two graphical figures of the marginal effect of cooperation on respectively quality of equipment and quality of work force. They show the marginal effect of increasing cooperation with one member and the effect of collaboration versus single municipal service delivery which are shown when moving from 1 to 2 members, and stays fixed after that.

Model 1 indicates that IMC has a negative effect on access to medical equipment. Number of members does not have a significant effect in the linear model. Figure 1 provides nuance to the linear model and shows that the marginal effect is significant from 1 and up to approximately six partners. This aids our interpretation by showing that the number of members has a significant effect. And though it is always negative, we see that the strongest negative effect takes place when going from one to more than one—indicating that the largest drop in equipment quality takes place when going from production in single municipalities to a cooperation, no matter the size of the cooperation. The negative effect of cooperation on equipment quality is however further significantly reinforced by an increase in the number of members, at least until the cooperation reach approximately six members. For larger cooperations, the negative effect is insignificant. The results thus indicate that the organizational form that has the best access to high-quality medical equipment is the single-municipal EPCs.

Model 2 shows that the effect of cooperation on quality of work force also is negative, but in this case the number of members has a positive effect. Figure 2 illustrates this graphically and shows a significant negative effect of going from single-municipal to cooperation mode, while the effect of each extra member in itself has a positive effect, significant from approximately six members.

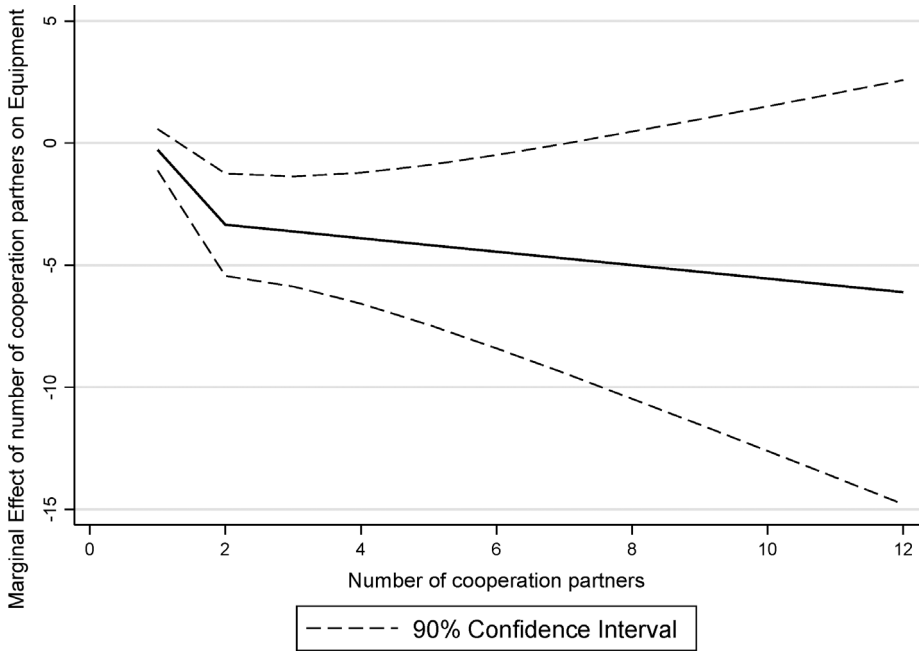

FIGURE 1 The effect of cooperation versus single municipality (from 1 to 2), and the marginal effect of number of members (from 2 to 12) on quality of equipment

The joint interpretation of this is that cooperations with two members (contra single-municipal units) weaken EPCs work force and that cooperation needs to reach a certain size before scale benefits are obtained.

2 | DISCUSSION

We started with two main hypotheses, derived from agency theory. The first was that cooperation would inhibit EPCs input quality and the second that an increase in members would lead to a decrease in quality due to multiple principal problems. The empirical findings only partially support the hypotheses, indicating that the effect of dispersed ownership depends on type of performance, that is, type of service quality. We find that some dimensions of input quality are more vulnerable for multiple principal problems than others. H1 is supported by the findings who indicate that moving from single-municipal production to IMC—independent of the number of members in the cooperation—lowers the input quality of both equipment and work force. The variable number of members in the cooperation makes the picture more nuanced—showing diverging results between the two dimensions of input quality. The results indicate that it is possible to reap some scale benefits on work force quality through cooperation, but this effect does not take place before a certain size is accomplished (in our case six or more members). For smaller cooperations, the drawbacks of cooperating seem to outweigh the benefits. This finding shows that the optimum size of operation is different for work force and equipment, indicating that the effect of multiple principals varies according to the type of input quality—at least in the case of Norwegian EPCs.

IMC represents a situation where several principals, all of them with potentially different preferences, for instance over funding, and overall priority of the service, must agree. The EMCs access to medical equipment is thus dependent on the principals' decision to invest. Given the weak state regulation of the service field, such investment is highly dependent on principals prioritizing and agreeing. The development over the past years for Norwegian EPCs has been that central authorities have increased their expectations to what medical equipment these units should

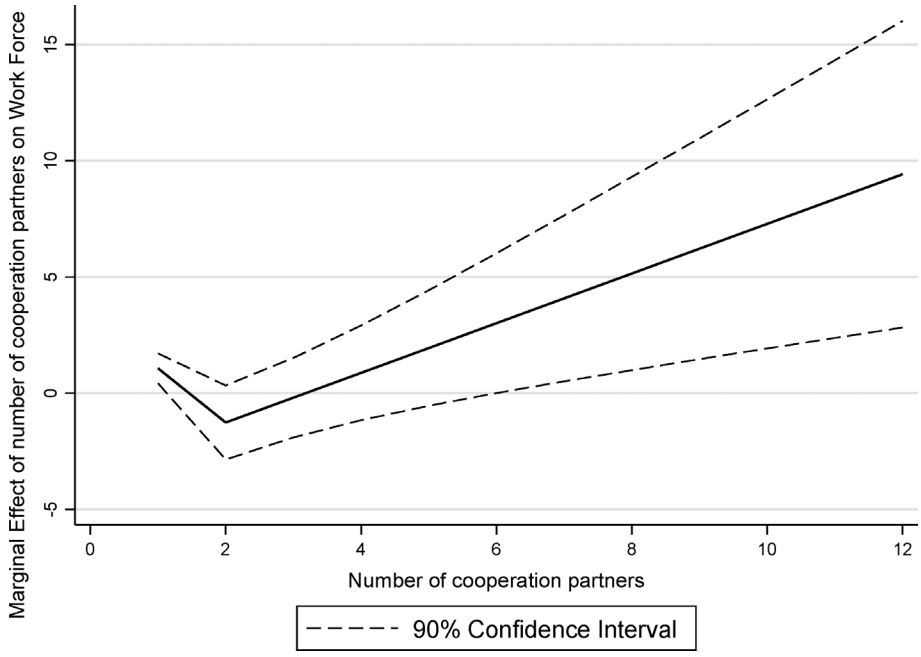

FIGURE 2 The effect of cooperation versus single municipality (from 1 to 2), and the marginal effect of number of members (from 2 to 12) on quality of work force

have access to. These expectations are, however, not made mandatory (The Norwegian Directorate of Health, 2020). When we consider that the general development is that EPCs have been getting access to more equipment (Morken et al., 2019), our results indicate that intermunicipal collaborations are not able to keep up with the increase in the availability of equipment to the same extent as the single-municipal service units. And the more members included in the cooperation, the more difficulty they have in accumulating these capital goods. The findings support our assumption that cooperation leads to multiple principal problems and that this problem increases with the number of principals when it comes to EPCs access to medical equipment.

The results on the two forms of input quality are diverging. We argue that the reason for this lies in the specific service context. While investment in capital goods (equipment) is determined at the service unit level, investments in labor—more specifically doctors—are determined by each municipality National laws and regulation obliges each municipality, regardless of size, to provide medical services from a municipally employed doctor. Furthermore, the laws and regulations oblige each municipally employed doctor to devote some time to a municipal or intermunicipal EPC (The Norwegian Directorate of Health, 2020). The increase of each member to the cooperation here thus also activates almost "automatically" an increase in the EPCs pool of doctors available for duty. Access to doctors is thus almost independent of any prioritizing in the deciding organs of the EPC. This stands in contrast to investments in capital goods that needs to be agreed upon and financed separately by every principal and transferred to the intermunicipal level. The negative effect shared service delivery has on the accumulation of capital goods may lie in problems with free-riding among principals. The dispersion of ownership wears out each owner's responsibility which hinders their incentive to invest. We may thus argue that investments in labor is not as vulnerable to multiple principal problems as investments in equipment and have greater possibility for creating benefits of scale due to the number of partners (see also Blåka, 2017a; Blåka, 2017b). Interestingly, results show that moving from single municipality production to cooperation results in lower access to work force. This indicates that the cooperation needs to reach a critical size to be able to reap this benefit.

Most important, this study shows that—at least for a specific public service in Norway—IMC is no guarantee for increasing service quality. On the contrary, cooperation in itself seems to create obstacles that in fact lower quality. The most reasonable explanation for this decrease in quality is to be found in problems and cost associated with multiple principals and dispersed ownership, supporting previous studies (Sørensen, 2007; Voorn et al., 2019). However, the study also shows that cooperation does not necessarily have a uniform effect on performance—indicating that the possibility to extract quality gains due to cooperation depends on what dimension of quality you consider. While the quality of some input factors remains stable or decreases with the number of members in a cooperation, the quality of other input factors may increase with the number of members. In this study, we argue that this can be explained by whether resources are located at the municipal or intermunicipal level.

We need to emphasize that there are several methodological shortcomings in this study. First of all, as Arntsen et al., (2021, p. 273) points out, "the diverse and complex nature of service quality within the context of health care makes it difficult to capture through objective measures." What this study captures are some aspects of service quality. Another limitation in this study is the narrow focus on organizing of IMCs. Organizational features of IMC can be broken down into various typologies (Hülst & Montfort, 2012; Hulst & Van Montfort, 2007; Voorn et al., 2019). The only dimension included in our analyses are number of members, while recent studies have shown that formalization of cooperation also is of importance when it comes to the IMCs performance (Bel & Warner, 2015b; Blåka, 2017a; Voorn et al., 2019).

3 | CONCLUSION AND SUGGESTIONS FOR FUTURE RESEACH

The general finding in this study is that cooperation—when production volume is held constant—has a negative effect of quality. This indicates that EPC—when input quality is a concern—is provided best by single municipalities. What this study further advocates is that the possibility to extract scale benefits from cooperation depends on what type of performance you measure and the number of cooperating members. The divergent findings support a need to untangle dimensions of performance to differentiate effects of cooperation. We conclude, like Holen-Rabbersvik (2019) that future research needs to address "how and when IMC is most beneficial" (p. vi).

When it comes to generalizability, we argue that EPCs represents a type of service characterized by high asset specificity and a need for redundancy. As pointed out earlier, most studies on effects of IMC focus on costs in the field of technical services like solid waste collection that can be characterized by high asset specificity and low need for redundancy. This study advocates that cooperation—meaning multiple principals—inhibits a service's capability to invest in asset specific capital goods. However, resources that exist in member municipalities independently of organizing have the potential to create scale benefits when being shared. But in this case, the number of principals needs to reach a certain point to be able to create this redundancy. We call for empirical studies on services with a variety of characteristics to check the robustness of these assumptions. We especially need to investigate services that score differently on these dimensions to better understand what determines different effects of cooperation. As pointed out earlier, the prevalence of shared service delivery span across a variety of service areas. Future studies should also examine tasks with low need for redundancy and asset specificity. An example of this is auditing services where there is very little uncertainty in demand, little need for investment in expensive transaction specific capital goods and low spatial dependency. Even so, this is—at least in the Norwegian context—a service field where approximately 80% of the municipalities have chosen to provide the service cooperatively (Monkerud et al., 2016). These different (transaction) framework conditions could indicate that such types of services could have greater possibilities to extract scale benefits. If we consider this study in comparison to former research, we can discuss the importance of differences in regulatory context. State regulations of the specific service area may hinder scale benefits linked to cooperation (Aldag et al., 2020; Blåka, 2017a). This taps into classical discussions of central versus local service regulation (Page, 1991; Rauch, 2008) and thus degrees of universalism (Titmuss & Seldon, 1968). Blåka (2017b) shows that for fire services, the more members who are included in a cooperation, the poorer the quality for each

member becomes. This is a service that are subject to more detailed state regulation while EPCs stand more freely in organizing their service offer (Blåka, 2017a, 2017b; Kiran et al., 2020; The Norwegian Medical Association, 2015). For instance, fire services are subject to stricter requirements than EPCs when it comes to maximum distances to inhabited areas making EPC less spatially dependent. Such factor may create greater possibilities for creating local gains from cooperation, setting the optimum scale of operation at a higher number of members than possible for more regulated services (Bel & Belerdas-Castro, 2021; Blåka, 2017a, 2017b).

This brings us to our final point in suggestions for future research. Our findings indicate that number of members in collaboration has more impact than the distinction between hierarchy and cooperation when it comes to access to labor. This means that how one chooses to organize cooperation is of great importance. Cooperation should not just be regarded as one uniform way of organizing but rather as a main mode that varies on several dimensions. The main structural element we have focused on here is size. The importance of cooperations' organizational form has also been emphasized in recent literature, both in the form of size (Blåka, 2017a, 2017b; Elston & Dixon, 2020; Sørensen, 2007) and formalization (Bel & Warner, 2015b; Blåka, 2017a; Voorn et al., 2019), and does in our case indicate that the form of cooperation may be of even greater importance than the traditional distinction between cooperating or not.

Because of the diverging results, this study indicates that the positive effects of cooperation are more limited than popularly assumed (e.g., Hulst & Van Montfort, 2007), making it important for policymakers to be cautious in their promotion of shared service reforms. As noted by Aldag et al. (2020, p. 286): *Shared services are no panacea*. It underlines a need for policymakers to be clear about the desired goals of cooperation (Aldag et al. (2020, p. 286)), given that the success of shared service delivery depends on (and vary between) type of service, type of performance, and organizational form (number of members) in the cooperation. Service sharing can lead to benefits of scale (the more the merrier) if the goal is to share resources that already exists in the member municipalities, but may not be suitable if the goal is to allocate new resources at the intermunicipal level.

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CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data provided by National Centre for Emergency Primary Health Care are however not publicly available due to ethical restrictions.

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ENDNOTE

[1] The equation is $\Sigma(NP_i * POP_i)/POP_{tot}$, where NP_i = net profit (in percent) in municipality *i*, POPi = population in municipality *i*, POPtot = the sum of the population in the intermunicipal cooperation

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