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Education providers' take-up of government grants

Evidence from a grant allocation discontinuity

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Evidence from a grant allocation discontinuity

by

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Abstract

In decentralized school systems where core funding comes from local governments, education providers can sometimes be entitled to central government grants on top of the core funding (e.g. Title I in the US). In Sweden, government grants that public and private education providers can claim have grown over time; from around 3 % of compulsory school costs in 2010 to 7 % in 2023. The grants, which typically are tied to specific purposes, are a way for the government to exercise control over various school policies in a decentralized system. However, for the grants to have an impact, the providers must claim their entitlements which requires submitting a detailed plan for fund usage and not all providers do this, especially not smaller private providers. We study how the size of the grant entitlement affects providers' take-up decisions. This is a margin that readily can be adjusted by e.g. merging smaller grants to a single larger. We exploit variation from a large grant in Sweden that allocated substantially more money to providers with a socioeconomic student composition below a certain threshold value. Using a regression discontinuity design, we find that take-up among private providers increased from 70 % to 88 % as the grant amount increased from about 4 % to 13 % of the total cost per student. Importantly, the effect on take-up appears to be sticky as it remains in a later year when the compensatory part was removed from the grant and all providers were entitled to the same amount per student.

Keywords: Education provider; government grants; take-up; grant size; discontinuity
JEL-codes: I22, I28, H81

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1 Introduction

In many areas, governments provide additional funding through grants to stimulate investments or spending that is socially optimal or desired, but where firms and organizations have few incentives or possibilities to invest themselves. This is the case, amongst others, for research and development (R&D) subsidies (Takalo, Tanayama and Toivanen 2013), subsidies for individuals' or firms' transition to green technologies (Springel 2021; Muehlegger and Rapson 2022), but also subsidies and programs related to schools and adult-life re-training (Martins 2021; Dillon et al., 2026). While there is variation in the application costs of such grants, individuals, firms or organizations will apply whenever expected benefits exceed the expected costs of applying. Understanding the determinants of grant take-up is therefore important for assessing how grants are (optimally) allocated, and whether government funding programs achieve their intended reach and effectiveness, and can ultimately matter for the evaluation of such programs.

In this study, we analyze the take-up of non-competitive grants targeted at education providers in Sweden.[1] In this setting, we study how sensitive (private) providers' grant take-up rate is to variation in the size of the grant entitlement. We exploit a large temporary grant entitlement discontinuity in a grant program, called the Elementary school grant (in Swedish: *Lågstadiesatsningen*), which was designed to be an additional central government grant funding on top of the core local government funding, and which had the aim of increasing the teacher-to-student ratio in the lower grades of primary schools in Sweden. The discontinuity was caused by a compensatory component in the program that allocated a substantially higher grant to education providers with a socioeconomic student composition below a certain threshold value. To claim the grant entitlement, an education provider needed to submit a sufficiently detailed plan for fund usage. Afterwards, the provider also needed to have sufficient documentation of fund usage to avoid repayment claims.[2] Compared to public education providers who virtually all apply regardless of their grant entitlement, we find substantial effects among private providers: as the grant entitlement approximately triples from just above SEK 4,000 (USD 425) to just below SEK 13,000 (USD 1,380) per student, take-up increases from 70 to 88 percent. Moreover, the effect is strongest among smaller providers and those that had not previously claimed the grant, and it persists even after the entitlement discontinuity is removed, suggesting that initial application costs create lasting barriers to participation.

[1] The term education provider refers to the organization that runs a school or multiple schools. Most schools in Sweden are run by the 290 municipality governments. But there are also around 560 private education providers, which can be for-profit firms or other types of organizations.

[2] In surveys and interviews, many providers describe these paperwork requirements as substantial, although it is hard to quantify exactly how much time they must devote to it (Skolverket 2017).

This study contributes to two strands of the literature. First, it contributes to the literature on school finance and compensatory education funding. Governments frequently use targeted grants to encourage investments and spending in schools serving disadvantaged students (e.g. Title I in the US), or to promote specific educational objectives. Existing research has primarily examined how such funding affects spending, resource allocation and student outcomes (e.g. Leuven et al. 2007; van der Klaauw 2008; Jackson, Johnson and Persico 2016; Jackson 2020). While there is variation, most of the papers in this literature document substantial positive effects on learning outcomes, suggesting an important role for targeted grants in increasing the quality of education. However, this literature typically treats grant receipt as given. We, instead, study an earlier stage of the policy process by focusing on providers' decisions to claim available funding. Exploiting a discontinuity in the size of the grant entitlement, we provide, to the best of our knowledge, the first causal estimates of the effect of the size of the grant entitlement on grant take-up. Our findings demonstrate that grant design influences not only the amount of resources received by participating schools but also participation itself. This highlights take-up as an important determinant of the effectiveness of compensatory funding policies in decentralized education systems.

Second, the paper contributes to the literature on benefit take-up and program participation. A large literature documents that eligible individuals frequently fail to participate in government programs and emphasizes the role of information frictions, compliance costs and administrative complexity in explaining incomplete take-up (Currie 2006; Bhargava and Manoli 2015; Finkelstein and Notowidigdo 2019; Ko and Moffitt 2024). More recently, the concept of administrative burden has been used to explain how application procedures and compliance requirements affect participation in public programs (Herd and Moynihan 2025). There is also a set of papers showing that the benefit level matters for benefit take-up at the individual level (e.g. Dahan and Nisan 2010; Zantomio 2015; Rosenqvist and Selin 2023). While this literature has focused primarily on households and individuals, many government programs target organizations that must actively apply for funding. In Sweden, e.g., central government grants are a common governance tool in several large sectors that primarily rely on local government funding and that have both public and private providers; e.g. health care, elderly care and education (SOU 2024:50).[3] We provide causal evidence on how financial incentives affect program participation decisions among education providers.[4] Our results show that grant size is

[3] Another example of an application-based formula grant is the so-called Rural Education Achievement Program (REAP) in the U.S. The purpose of this grant is to increase quality of teaching in rural school districts and eligible education providers must apply for the grants on an annual basis (Crawford, Shoemaker DeMio and Partridge 2025).
[4] Earlier Swedish government reports have discussed the role of grant size for grant take-up but the relationship has not been empirically tested in a causal framework (Riksrevisionen 2014, 2017).

an important determinant of take-up and that even temporary increases in grant entitlements can have persistent effects on participation, consistent with the presence of fixed application costs. These findings suggest that the design of grant programs targeting organizations can influence participation rates independently of the total amount of funding available.

The paper has the following structure: In section 2, we describe the Swedish compulsory school system, sources of school funding and the details of the Elementary school grant. We also explain how the grant entitlement discontinuity that we are exploiting arises. Section 3 describes the provider-level data used for the analysis, and in section 4, we outline and test the empirical strategy. In section 5, we present the main results, robustness checks and heterogeneity analyses. Section 6 concludes.

2 School funding in Sweden and the Elementary school grant

2.1 Funding in the Swedish compulsory school system

The Swedish compulsory school system is publicly funded and consists of public and private education providers. There are almost 4,670 primary schools run by approximately 850 providers (in 2024). 290 of these providers are municipality governments that run all the public schools in their respective municipalities. About 85 % of the 1.1 million compulsory school students attend a school run by a municipality government, and in total the municipality education providers run close to 4,000 schools. The remaining education providers are private and there are both non-profit and for-profit private providers. Parents can apply to any school, public as well as private, but if there is oversubscription, the child might not be accepted for enrollment. If a school is oversubscribed, children with a home address closer to the school are prioritized. Some private providers also consider queue time when constructing the priority ranking.

The municipality governments are responsible for funding compulsory school, and they, in turn, get their revenues from the municipality income tax, fees and so-called *general* central government grants. The general central government grants are disbursed automatically to the municipalities and the municipalities decide how to distribute this funding across the municipal responsibilities, i.e. they are not required to use it for school funding. The municipality government decides how much of the revenues should be allocated to schools and it should be noted that the municipality must give the same funding per student to the private providers with schools in the municipality as to their own public schools. Neither public nor private schools are permitted to charge tuition fees to raise additional funding.

On top of this core funding from the municipality governments, there are also so-called *targeted* central government grants that municipalities and private providers can apply for. These

grants can only be used in the schools and are often tied to specific purposes (e.g., increasing the teacher-to-student ratio, setting up a library, purchasing new teaching materials). The grants can be viewed as a way for the central government to exercise control over various school policies in a decentralized system. In 2023, there were close to 40 different targeted government grants that in total amounted to around 7 % of the costs for compulsory education in Sweden; up from around 3 % in 2010 (Skolverket 2025). Thus, the targeted grants currently constitute a non-negligible share of compulsory school funding. There are a few large grants (the two largest ones amount to just below 40 % of the overall grant sum) and many smaller ones.

The grants are non-competitive; instead, for a given grant, each provider is allocated an entitlement that the provider can claim by submitting a detailed plan for fund usage to the Swedish National Agency for Education. In the plan, the providers are expected to explain how they will use the grant money to fulfill the purpose of the grant. Note that each grant requires a specific plan, i.e. the provider cannot apply for money from different grants in the same plan. The size of the grant entitlement for a given provider depends on the overall size of the specific grant and the number of students enrolled with the provider. In addition, grants sometimes have a compensatory construction so that providers serving more disadvantaged students are allocated a higher entitlement per student than providers serving more advantaged students. In fact, the grant we focus on in this paper (the Elementary school grant) had such a compensatory construction which we use as a source of variation in grant entitlement (see more details of this grant in section 2.2 and 2.3).

Far from all education providers claim all their grant entitlements, and this is particularly true for private providers who have a markedly lower take-up rate (Riksrevisionen 2017). We are interested in providers' take-up behavior with respect to targeted government grants and therefore it is necessary to consider the costs and benefits associated with claiming a grant entitlement. With respect to the benefits, it is important to note that virtually all targeted grants in Sweden have a so-called "supplement not supplant" provision[5] which means that the central government funds should supplement rather than replace local funds. Thus, in principle, a municipality should not be able to use the grant funding to keep overall school expenditures constant while redirecting some of the local funding to other municipal responsibilities, e.g. elderly care. Also, for-profit private providers should not be able to use the grant funding to keep overall school expenditures constant while taking out higher profits. Instead, the benefits in claiming the grant entitlements lie in the possibility of using the additional funding to improve the quality of the provided education. For for-profit private providers, a better quality of the education might attract more students which in turn can lead to higher profits. For other providers, obtaining the highest

[5] This is also the case for the so-called Title I program in the US.

possible education quality given the available funding is arguably a goal in itself. Finally, since the grants are non-competitive, i.e. the applications are not evaluated relative to other applications, the perceived risk of rejection is arguably not so relevant for providers' grant application decisions. Applications can be rejected if they don't include all required elements but, in most cases, providers are likely to know themselves when an application is good enough. Thus, at least to our understanding, there is very little uncertainty involved with respect to the approval margin.

There are of course also costs associated with claiming the grant entitlements. The description of these costs in this paragraph draws heavily from Riksrevisionen (2017) who interviewed and surveyed providers on this and other topics. The provider must first of all write a detailed plan for fund usage. Afterwards, the provider needs to be able to present sufficient documentation for how the grant money was actually used. If the Swedish National Agency for Education deems that the documentation is insufficient or that the funding was used in the wrong way, the provider can be forced to pay back parts of the grant amount or even the entire grant. In surveys, providers have answered that uncertainty with respect to how the Swedish National Agency for Education is going to evaluate them and fear of doing something wrong and being labelled a cheater are important reasons for not claiming a grant.[6] In general, the paperwork requirements are often perceived as substantial by the providers, in particular since the time between the announcement of a grant and the application deadline often is short. Depending on the purpose of the grant, there can also be costs associated with putting the grant to use. For example, if the purpose of the grant is to increase the teacher-to-student ratio by allocating funds for having more teachers, the provider will need to put resources into the hiring process. If, in addition, there is uncertainty regarding for how many years the grant program will run, some providers might assess that it is too risky to hire new teachers based on the grant funding. Abstracting from the costs of claiming a grant, survey answers and interviews also suggest that some providers abstain from claiming grants since they feel that the grant objectives are misguided and shift attention away from other, more promising, school development efforts.

2.2 The Elementary school grant

The so-called Elementary school grant (in Swedish: Lågstadiesatsningen) targeting education providers serving students aged 6–9 (preschool grade to grade 3) existed during the five academic years 2015/16–2019/20. After that it was merged into another larger grant, the so-called Equity grant (see Rosenqvist and Sauermann 2025 for more details on this grant).

[6] It is hard to say how common repayment claims are in general, but in the first round of the Elementary school grant, about 20 percent of the providers had to pay back at least part of the approved grant amount (Skolverket 2018).

The purpose of the Elementary school grant was to increase the teacher-to-student ratio in the lower grades. In the law regulating the grant, SFS 2015:215, it was stated that the grant could only be used to cover costs for increasing the number of teachers, preschool grade teachers or special-education teachers relative to the number of students. Providers were also allowed to use the grant to increase the density of other staff in the school *if* that increase allowed teachers to spend more time on teaching. The law also clearly stated that the grant could not be used to cover costs for activities that the provider already offered (i.e. a so-called "supplement not supplant" provision). With respect to claiming the grant, the law stipulated that an application for the grant had to include a plan in which the provider should detail strategies for (1) recruitments in relation to retirements, (2) recruitments in relation to the reception in the schools of newly-arrived immigrant children, (3) securing access to certified teachers, (4) continuously working with improvements of school leadership and (5) using the grant to fulfill the purpose of the grant (i.e. increasing the teacher-to-student ratio in the lower grades). In practice, virtually all submitted applications were approved (Skolverket 2018). To the best of our knowledge, the application process was the same throughout the five years of the grant.

In terms of documentation of fund usage, the law required providers to submit relevant economic and other information to the Swedish National Agency for Education upon request. If the Swedish National Agency for Education assessed that the documentation was insufficient or that funds had been used incorrectly, the provider could be liable to repay parts of the grant amount or even the entire amount.

Table 1 shows the size and structure of the Elementary school grant in the different years of the program. In three of the years, 2016/17–2018/19, the grant contained both a basic part, which allocated the same amount per student to all providers, and a compensatory part which was only allocated to providers with a weak socioeconomic student composition (see more details on the allocation in the next section).[7] However, in the first and last year, the grant had no compensatory dimension. In the first year, the grant amounted to SEK 1.985 billion which translated into SEK 4,450 per student. To put this into perspective, we can note that the total cost per student in 2015 was SEK 100,900 (Skolverket 2017). In the subsequent years, the basic grant per student was slightly lower.

The compensatory purse was constant at SEK 0.329 billion during the three years in which it existed. Note that the compensatory grant per student refers to providers that were allocated

[7] About 20 % of the providers were entitled to money from the compensatory purse. The introduction of the compensatory part was partly motivated by the fact that some schools received many immigrant children following the refugee crisis in 2015. But the government also argued that schools with a challenging student body more generally needed extra support to increase quality in teaching (Swedish Government 2016; SFS 2016:369). Note, however, that the National Agency for Education had wide discretion in terms of operationalizing these criteria.

money from the compensatory purse. If a provider was assessed to be eligible for the compensatory grant, the provider received an allocation that was the maximum of the basic grant amount or SEK 280,000. Since most providers had a basic grant allocation that was larger than SEK 280,000 (i.e. they had more than about 70 students in the relevant grades), the compensatory allocation was typically equal to the basic allocation for a total allocation of two times the basic allocation. However, for small providers the basic grant allocation could be substantially smaller than SEK 280,000 and thus they had a compensatory allocation that was larger than the basic allocation. Therefore, their total allocation could be much higher than just two times the basic allocation. In our data, it is only private providers that have a total allocation larger than two times the basic allocation since municipalities always have more than 70 students in the relevant grades (see Figure 3 for a visualization of this).

While the providers were only guaranteed to receive a grant amount equal to their entitlement (conditional on submitting a sufficient plan), they could apply for an amount that was higher than the entitlement. The money allocated to the grant program covered all entitlements and if some providers didn't claim their entitlements, there were remaining funds that could be distributed to the providers that actually submitted a plan. The government expected that there would be remaining funds after all applications within the entitlements had been handled and therefore, at the point when the entitlements were disclosed, it was communicated to the providers that they could apply for an amount that was up to 50 % higher than the entitlement and that this "extra money" potentially could be approved depending on the take-up rate. When allocating "leftover" funds among the providers that had applied for funding in excess of their entitlement, the government prioritized providers with a weak socioeconomic student composition. Thus, if anything, the way the government handles the leftover funds in practice increases the grant entitlement even more for providers with a weak socioeconomic student composition.

Table 1 The size and structure of the Elementary school grant

		Basic purse		Compensatory purse
Year	Total	Per student	Total	Per student
2015/16	1.985 billion	4,450	0	0
2016/17	1.970 billion	4,253	0.329 billion	at least 4,253
2017/18	1.971 billion	4,110	0.329 billion	at least 4,110
2018/19	1.971 billion	4,113	0.329 billion	at least 4,113
2019/20	1.971 billion	4,065	0	0

Note: The table shows the size of the Elementary school grant in the different years of the program (Skolverket 2018). All numbers are in SEK in current prices.

2.3 The discontinuity in the grant allocation schedule

Table 2 shows how the grant is allocated to providers depending on their rank, where 1 represents the weakest socioeconomic student composition.[8] Note that the table does not contain the actual data; it is a fictive example to explain how the discontinuity arises. All the amounts mentioned in the table and in the text below are in SEK. First, for this example, we assume that the basic grant was 4,110 per student and that the compensatory purse amounted to 329 million (which was the case in 2017/18). Thus, the provider with rank 1, which has 243 students, receives a basic grant allocation of approximately 1 million. Of course, this provider is also entitled to money from the compensatory purse and since the basic amount is higher than 280,000, the compensatory amount is set to be equal to the basic amount. In total, this provider therefore receives a 2 million allocation which translates to 8,220 per student. After having allocated money to the provider with rank 1, the government has used 1 million from the compensatory purse (see column 5).[9] The provider with rank 2 also has 243 students and so this provider's allocation is identical to the one of the provider with rank 1. After having allocated money to the provider with rank 2, the government has used 2 million from the compensatory purse. The provider with rank 3 has 972 students and therefore receives a basic grant of 4 million and a compensatory grant of 4 million. However, the total grant per student is still 8,220. After having allocated money to the provider with rank 3, the government has used 6 million from the compensatory purse.

The government then continues down the list of providers and allocates money according to the same principle. After having allocated money to the provider with rank 150, the government has used 328 million from the compensatory purse. Thus, there is only 1 million left to allocate from the compensatory purse. The provider with rank 151 has 486 students and therefore receives a basic grant of 2 million. But since there is only 1 million left in the compensatory purse, the provider only gets a compensatory grant of 1 million for a total grant of 3 million. Thus, in terms of total grant per student, the provider with rank 151 ends up just in between providers entitled to the full compensatory grant (8,220 per student[10]) and providers above rank 151 who are only entitled to the basic grant (4,110 per student). Empirically, we will define the "in-between" provider as belonging to the treated category. It is important to recognize that the cutoff does not

[8] We don't know the exact ranking procedure, but in other settings the National Agency for Education has generated a composite measure of socioeconomic background at the student level by predicting grades based on background characteristics such as, e.g., immigration status, parental education and income and residential area. From these values, they have generated averages at the provider level (Rosenqvist and Sauermann 2025). Our contacts with the National Agency for Education indicate that they have used a similar method for the ranking in the Elementary school grant, although the exact approach and included background characteristics remain unknown to us.

[9] Note that the money is just allocated (or reserved) at this point. Whether or not the provider actually applies for the allocated amount is a later question which is not relevant for the allocation algorithm.

[10] As noted in section 2.2, small providers can get a compensatory grant that is much larger than 4,110 per student since the minimum compensatory grant is 280,000. For simplicity, we do not include any small providers in the example in Table 2.

depend on the take-up decisions of providers; the cutoff is generated at an earlier stage when *allocations* are determined. According to Skolverket (2018), allocations for the coming academic year were communicated to providers around April[11] and then there was an application period of around 2–3 months in the different years.

Note that the cutoff between providers receiving or not receiving an allocation from the compensatory purse is very hard to predict beforehand. The position of the cutoff is going to depend on the size of the providers who have a relatively low rank. If many large providers have a low rank, the compensatory purse will be exhausted relatively quickly and the cutoff will come at a relatively low rank. However, if many of the worst ranked providers are small, the position of the cutoff will be at a higher rank. Thus, the cutoff can vary between years, even for a fixed compensatory purse, as student composition and ranking procedures change. This is reflected in the actual data where the cutoff for the academic year 2016/17 is at rank 200, while the corresponding cutoff for 2017/18 and 2018/19 is at rank 127.[12] The size of the compensatory purse was 329 million in all three years.

Table 2 Illustration of the grant allocation discontinuity

(1) Rank	(2) # of students	(3) Basic (kr)	(4) Compensatory (kr)	(5) Compensatory cumulative (kr)	(6) Total/student (kr)
1	243	1 million	1 million	1 million	8,220
2	243	1 million	1 million	2 million	8,220
3	972	4 million	4 million	6 million	8,220
and so on	.	.	.	.	.
.	.	.	.	.	.
150	243	1 million	1 million	328 million	8,220
151	**486**	**2 million**	**1 million**	**329 million**	**6,165**
152	486	2 million	0	329 million	4,110
153	729	3 million	0	329 million	4,110
and so on	.	.	.	.	.
.	.	.	.	.	.

Note: The table does not contain the actual data; it is a fictive example to explain how the discontinuity arises.

[11] Our understanding is that it was communicated to the providers at this point that they could apply for an amount that was up to 50 % higher than the entitlement and that this "leftover money" potentially could be approved depending on the overall take-up rate.

[12] The National Agency for Education used the exact same allocation schedule in 2018/19 as in 2017/18. Our contacts with the Agency indicate that this was because of time constraints. Our understanding is that providers did not know beforehand that the exact same allocation would be used. Our contacts with the Agency also indicate that there was a slight change in the ranking procedure between 2016/17 and 2017/18. This change appears to have led to a lower (i.e. worse) rank for some larger providers which meant that the compensatory purse was exhausted at an earlier position in the ranking (127 rather than 200).

3 Data

The National Agency for Education (Skolverket) has provided us with provider level data from the different rounds of the grant program, i.e. the five academic years in the period 2015/16–2019/20. There are three sets of files in the data that can be merged via a provider identifier. First, we have the entitlement files (*bidragsramar*), which contain a list of all providers eligible for the grant and the allocated amount that they can apply for. These files define the study population.

Second, there are decision files (*bidragsbeslut*), which contain a list of the approved amount for all providers who applied for the grant. Virtually all providers who applied were granted at least[13] their allocated amount and thus there is in practice no difference between the margins applying and getting the application approved. In the empirical analysis, the main outcome is defined as the provider being in the decision file meaning that the provider applied for the grant.

Third, for the three rounds that contained a compensatory grant (2016/17–2018/19), we also have ranking files. This is a list of all providers and their ranking with respect to socioeconomic student composition. The provider with rank 1 has the worst socioeconomic student composition and so on. Note that there are a few examples of providers that appear in the ranking file but not in the entitlement file. Since the study population is defined by the entitlement files, these providers are excluded from the analysis.[14] There are also a few examples of providers appearing in the entitlement file but not in the ranking file. These providers are always only entitled to the basic grant allocation, but since we cannot define the running variable for these providers they cannot be included in the regression discontinuity design.

In Table 3, we describe the main structure of the data. There are three types of providers. First, we have the 290 municipalities (local governments) that serve around 85 % of the students in compulsory school. The municipalities generally have strong administrative routines when it comes to grant applications as indicated by the almost complete take-up of the Elementary school grant. It is directly clear from the table that it is not meaningful to study the effect of a higher grant allocation on take-up for the municipalities.[15] Second, there are two central government education providers in the data. The government education providers serve very few and very specific students; one provider serves students from the Sami minority, and the other provider is targeting students with disabilities. While the government providers are included in the entitlement files, they are not ranked and can consequently not be included in the main analysis.

[13] As noted earlier, providers could apply for a bit more than their allocated amount. This could be relevant if not all providers applied for their allocation. Providers with a low rank (i.e. weak socioeconomic student composition) were prioritized also with respect to this "leftover" money.
[14] This also means that, as the ranking file is merged with the entitlement file, some rank numbers will not be represented among the providers in the entitlement file. For example, if a provider with rank 100 in the ranking file does not appear in the entitlement file, there will be no provider with rank 100 in the analysis data.
[15] Still, for completeness, we show a limited set of results also for municipalities.

Third, we have the private providers who are of central interest in this study because of their lower take-up rate. There are around 500 private providers; most private providers are in the data all years but there are also closures and entrants from one year to another which explains the varying number of providers. Around 42 % of the private providers are for-profit providers.[16] Focusing on the take-up rate, we note that the low take-up in the first year of the grant program stands out. In this year, entitlements to a value of around SEK 63 million remained unclaimed by the private providers, which resulted in a take-up rate of 54% in the first year. In the later years, take-up is between 72 and 80 %. The fact that take-up among the private providers increases over the first 2–3 years could partly be due to a learning process, i.e. that it takes a bit of time to become aware of the grant and what paperwork you should submit to claim it.[17] But it is also important to note that the compensatory grant was introduced on top of the basic grant in the second year which, at least for some private providers, potentially made it more attractive to apply for the grant allocation in the second year as compared to the first. However, to the best of our knowledge, there was no information campaign about the grant in the second year specifically targeting providers that were entitled to funds from the compensatory part. Thus, there is no reason to believe that providers entitled to funds from the compensatory part were more informed about the existence of the grant and the application process.

Finally, while not included in the table, it should be emphasized that the municipalities, on average, serve many more students than the private providers. The mean (median) number of students in grades 1–3 and in the preschool grade for municipalities is 1,454 (678), while the corresponding number for private providers is 97 (65). This size difference and the fact that municipalities have run schools for a very long time are likely important explanations for differences in administrative capacity and in turn take-up of grants.

Table 3 Description of the education providers in the data

	Municipalities		Private providers		Government providers	
Year	# of providers	Take-up rate	# of providers	Take-up rate	# of providers	Take-up rate
2015/16	290	100 %	489	54.19 %	2	100 %
2016/17	290	100 %	516	72.09 %	2	100 %
2017/18	290	98.28 %	506	79.25 %	2	50 %
2018/19	290	97.59 %	501	76.05 %	2	50 %
2019/20	290	98.28 %	497	75.65 %	2	50 %

Note: The table includes all providers included in the entitlement files, i.e. before imposing any sample restrictions. The take-up variable takes the value 1 if the provider appears in the decision file of the relevant year.

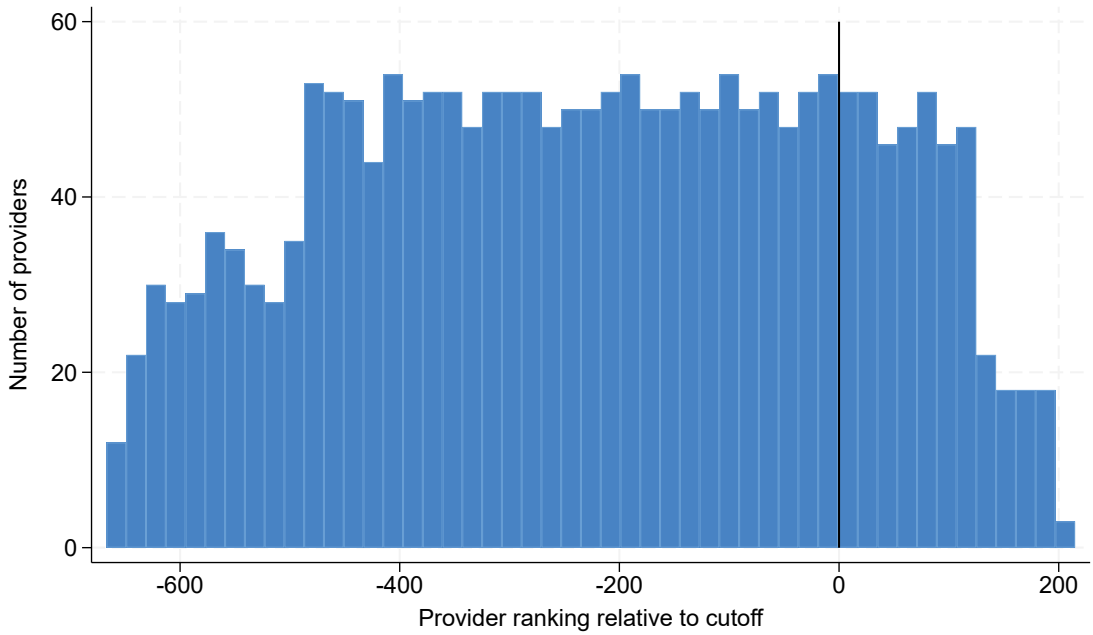
[16] This number goes up slightly to 44 % once we apply the sample restrictions in section 3.1.
[17] Since grant entitlements are communicated to providers, all providers should in principle be aware of the existence of the grant. Thus, learning arguably mostly entails finding out details about the grant and how to claim it.

3.1 Sample restrictions

Since our empirical strategy relies on variation in grant allocations coming from the allocation of the compensatory part of the grant, our analysis sample is restricted to providers included in the entitlement files for the years 2016/17–2018/19, i.e. the years when the grant program included an additional compensatory purse of SEK 329 million (see Table 1). About 12 % of the observations in the entitlement files for these years are not included in the ranking files for the respective years which means that we cannot define the running variable for these observations. Thus, we must exclude these observations from the analysis sample. After these restrictions, we are left with 2,102 provider-by-year observations. From this sample, we drop an additional 16 observations that have fewer than 6 students. In the final analysis sample, there are 868 provider by year observations for the municipalities and 1,218 provider-by-year observations for private providers.

Figure 1 shows how the providers in the analysis sample are distributed across different ranking values that have been normalized by the cutoff rank, which was at 200 in 2016/17 and at 127 in 2017/18–2018/19. Naturally, we see a more or less uniform distribution between values -490 and 127 since these values exist in all three years. There are some small variations in the number of providers and these are caused by the fact that there are a few gaps in the ranking. As noted above, these gaps arise when a provider appears in the ranking file but not in the entitlement file. In such a situation, no provider in the entitlement file, which defines the study population, will have that specific ranking value. The number of providers drops at the ends because values between 128 and 199 only exist in 2016/17 and values between -491 and -667 only exist in 2017/18–2018/19.

Figure 1 Number of providers at different normalized ranking values



Note: The figure shows the number of providers at different normalized ranking values. We stack data from three years: 2016/17, 2017/18 and 2018/19.

4 Empirical strategy

To estimate the causal effect of an approximate doubling of the grant allocation on grant take-up, we use a regression discontinuity (RD) design, as described by equation (1).

$$Y_{pt} = \beta_0 + \beta_1 Compensatory_{pt} + \beta_2 Rank_{pt} + \beta_3 (Compensatory_{pt} * Rank_{pt}) + \varepsilon_{pt} \qquad (1)$$

The level of observation is provider (p) by year (t) and we stack data from three years: 2016/17, 2017/18 and 2018/19. The main outcome variable takes the value 1 when the provider applies for the grant allocation and 0 otherwise. We will also plug in allocations and actual granted amounts on the outcome side of the equation to visualize the discontinuities in those variables. The variable "Compensatory" takes the value 1 if the provider is entitled to money from the compensatory purse and 0 otherwise. This means that the so-called "in-between" providers from section 2.3 are defined as being on the treatment side of the cutoff. The variable "Rank" is the running variable which we have normalized by the cutoff rank so that it contains values between -667 and 199. 0 and positive values indicate eligibility for the compensatory grant, while negative values indicate providers that only are entitled to money from the basic grant. Remember, in 2016/17 the cutoff was at rank 200 while it was at rank 127 in 2017/18 and 2018/19. We assume a linear relation between the outcome and the normalized rank which is allowed to vary on the two sides of the

cutoff. There are too few observations to use higher order polynomials. The low number of observations also forces us to use a relatively wide bandwidth in the main specification; a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right). Specifications with smaller bandwidths quickly become uninformative because of very wide confidence intervals. Below, in Table 4, we also show that specifications using the maximum bandwidth or the same bandwidth on both sides of the cutoff give results that are similar to the main specification. The parameter of interest is β_1 which captures the potential discontinuity in the outcome at the cutoff. As recommended by Kolesár and Rothe (2018) in the case of a discrete running variable, we use conventional robust standard errors. In some specifications, we also scale the discontinuity in grant-take up with the discontinuity in the entitlement per student. We estimate a so-called fuzzy RD to do this and the interpretation of the resulting IV-estimate is how take-up is affected by an increase of SEK 1,000 in the entitlement per student. This is particularly relevant when estimating heterogeneous effects as different groups of providers might have differentially large entitlement discontinuities (i.e. different first stages).

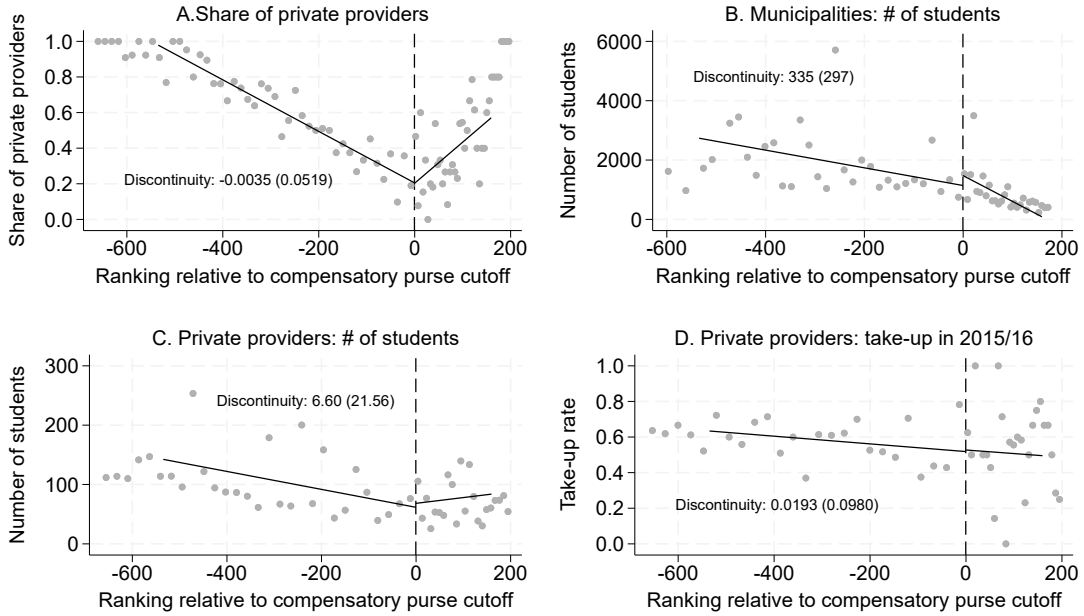
Causal identification of the effect of a higher grant entitlement on grant take-up requires the assumption that providers close to the cutoff are as if randomly assigned to the higher or lower grant entitlement. This in turn requires that providers cannot easily (i) adjust their value on the running variable, or (ii) predict the location of the cutoff. In this case, providers can do neither of these two things. The running variable, i.e. the ranking of the provider, depends on the socioeconomic composition of the student body which in itself is hard to quickly change. Importantly, providers are not allowed to select students with certain characteristics from the pool of applicants. Thus, if a provider wishes to change the socioeconomic composition of the students, they need to attract students with another background to the applicant pool which arguably is a more long-term process.[18] In addition, the providers do not know exactly how the National Agency of Education uses the student characteristics to construct the provider's composite socioeconomic index. Secondly, as explained in section 2.3, the position of the cutoff between the lower and the higher grant entitlement is not determined beforehand. Instead, it depends on the size of the providers with a relatively low rank (i.e. weak socioeconomic student composition). If a provider with many students has a low rank, the money in the compensatory purse will last shorter, i.e. cover fewer providers. Thus, it is virtually impossible to predict the position of the cutoff since it depends on the ranking and size of other providers. In sum, there are strong institutional arguments for why random assignment at the cutoff is expected to hold in this setting.

[18] It should also be noted that the National Agency of Education obtains their information on the socioeconomic background of the students from administrative register data, i.e. the providers cannot affect the ranking by reporting manipulated data to the agency.

Still, the assumption that providers close to the cutoff are as if randomly assigned to the higher or lower grant entitlement must be tested empirically. As previously noted, it is not meaningful to check for jumps in the density of providers at the cutoff since the running variable is a rank variable (see Figure 1). However, we have access to a number of predetermined variables at the provider level which we can use as dependent variables in Equation (1). If the assumption of random assignment at the cutoff is valid, the relationship between these variables and the running variable should be smooth over the cutoff. In Figure 2, we show the results of the balance tests. First, in panel A, we examine a dependent variable that takes the value 1 if the provider is private and 0 if the provider is a municipality. Private providers are more likely to be located at the extremes of the ranking, but, importantly, there is no discontinuity at the cutoff. In panel B and C, we study the number of students separately for municipalities and private providers. Again, this variable evolves smoothly over the cutoff for both types of providers.

A particularly useful feature of the dataset with respect to testing balance in predetermined characteristics is that we observe whether or not a provider claimed the grant entitlement in the first year of the program (2015/16) when there was no compensatory grant, only a basic grant which was the same per student for all providers. With this variable, we can check whether grant take-up evolved smoothly over the cutoff in a pre-period when there was no actual grant entitlement discontinuity at the cutoff. Since the municipalities had a 100 % take-up rate in 2015/16 (see Table 3), we only consider private providers for this balance test. In panel D, we observe a slightly negative relationship between take-up in 2015/16 and the running variable, i.e. private providers with a relatively weak socioeconomic student composition were somewhat less likely to claim the grant in 2015/16 when the allocation per student was the same for all providers. Reassuringly, however, there is no indication of a jump in take-up at the cutoff. This result strongly supports the assumption that providers just to the left and just to the right of the cutoff would have had the same take-up rate in the years 2016/17, 2017/18 and 2018/19 in the absence of a grant entitlement discontinuity, which, in turn, means that a potential difference in take-up rate at the cutoff can be interpreted as a causal effect of the higher grant entitlement.

Figure 2 Test of balance of predetermined provider characteristics



Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

5 Results

5.1 The discontinuity in grant entitlement and approved amount

First, in Figure 3, we visualize the discontinuity in the grant entitlement per student for municipalities and private providers respectively. For municipalities, in panel A, we see that the discontinuity virtually is equal to the basic entitlement per student so that municipalities eligible for the compensatory part of the grant (to the right of the dashed vertical line) are entitled to a total allocation per student of two times the basic amount. Since all municipalities have more than 70 students in the relevant grades, there is virtually no variation in the entitlement per student among municipalities to the right of the cutoff. However, since there are "in-between" providers (see discussion in section 2.3), we see a slightly lower entitlement per student for the bin just at the cutoff.

For private providers, in panel B, the discontinuity is much larger and there is much more variation in the entitlement per student among providers to the right of the cutoff. This is explained by the fact that there are relatively many small private providers who have a compensatory grant allocation that is larger than the basic grant allocation (since their basic grant allocation is lower than SEK 280,000). Thus, while we see a doubling of the entitlement at the cutoff for municipalities, there is roughly a tripling for the private providers. Since the total cost per student

was just above SEK 100,000 in 2015, the discontinuity for private providers corresponds to a grant entitlement increase from about 4 % to 13 % of the total cost.

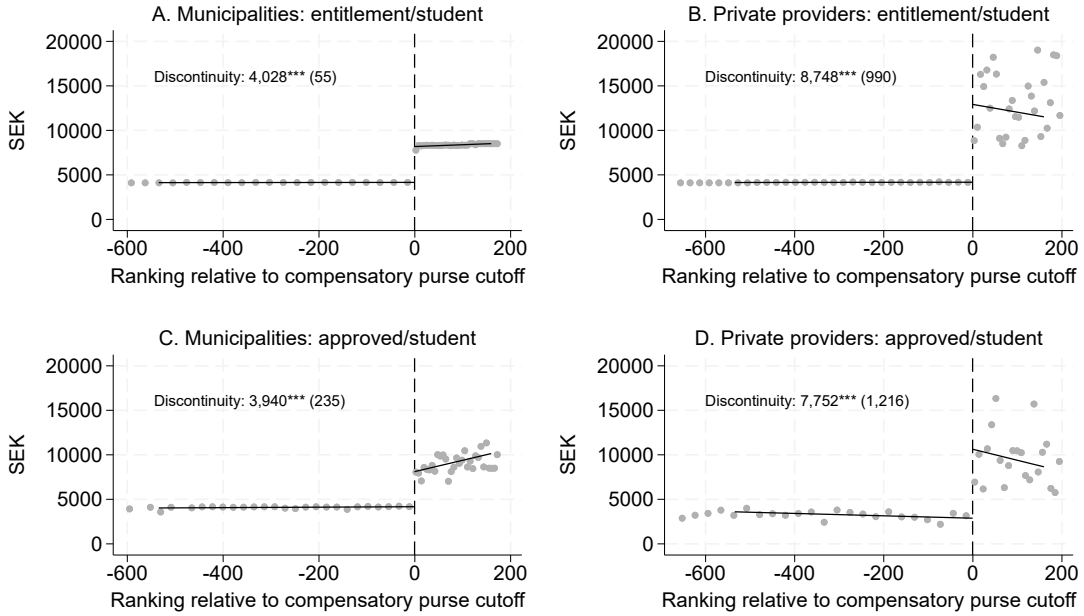
In the lower panels, C and D, we display corresponding RD-figures for the grant amount per student that was eventually approved. This variable is to some extent an outcome since it is affected by the providers' decisions to claim or not claim the entitlement. However, the approved amount is of course very strongly related to the initial allocation per student. It should also be noted that virtually all providers who submit a plan to claim the entitlement are approved; thus, rejection is not an important margin in this setting. For municipalities, the discontinuity in the approved amount per student is very similar to the entitlement per student. However, we see more variation between providers, particularly to the right of the cutoff. This variation is to some extent due to the fact that a small number of municipalities didn't claim their entitlement, but there is also another, more important, explanation.

As noted in section 2.2, providers could actually be granted an amount that was higher than the entitlement. The money allocated to the grant program covered all entitlements and if some providers didn't claim their entitlements, there were remaining funds that could be distributed to the providers that actually submitted a plan. Only providers that had applied for funding in excess of their entitlement could receive money from the "leftover" purse. When allocating "leftover" funds among the providers that had applied for funding in excess of their entitlement, the government prioritized providers with a weak socioeconomic student composition following the same ranking as for the compensatory purse. In sum, the procedure with the "leftover" money explains why we see variation between providers and a positive slope to the right of the cutoff in panel C.

The "leftover" funding also contributes to variation in the approved amount per student for private providers in panel D. But for private providers there was of course already variation in the entitlements. For private providers, take-up is also a much more important margin as we saw in Table 3. Incomplete take-up is the reason for why we see a somewhat smaller discontinuity in panel D as compared to panel B. Importantly, however, this doesn't mean that private providers to the right of the cutoff claimed their entitlements to a lower extent than providers to the left of the cutoff. Since providers to the right of the cutoff have larger entitlements, a given rate of incomplete take-up will lead to a larger decrease, in absolute terms, in the approved amount per student for providers to the right of the cutoff.

Lastly, while we focus on the providers' grant take-up behavior in this paper, the discontinuity in the approved amount per student offers an opportunity to estimate the causal effect of more funding, earmarked for increasing teacher density, on student learning outcomes. We study this question in a separate companion paper.

Figure 3 Discontinuities in entitlements and approved amounts per student



Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

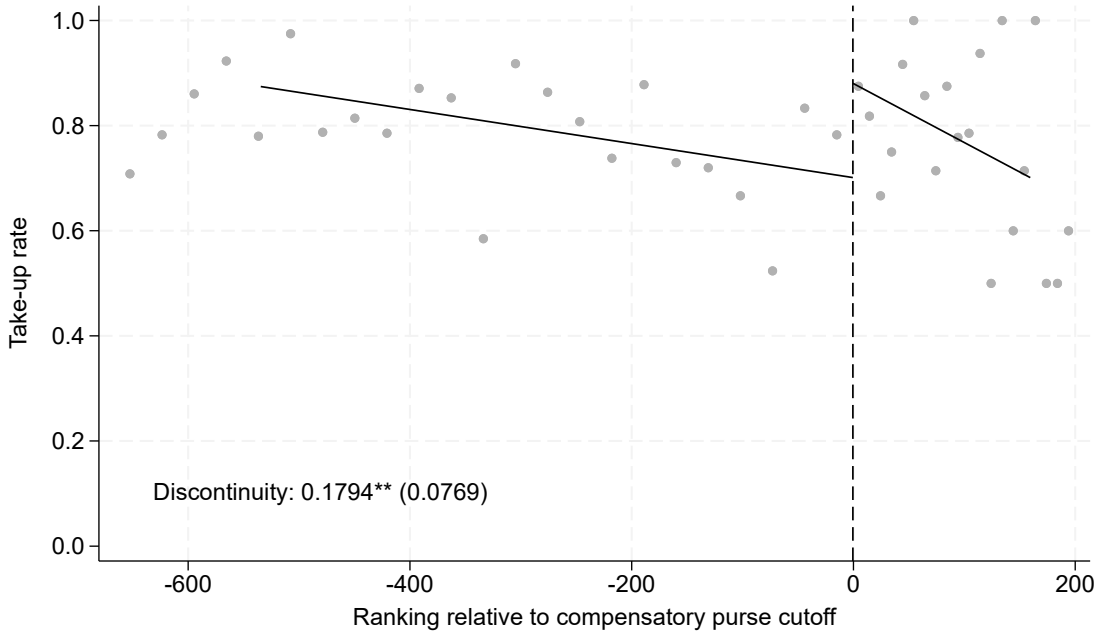
5.2 Effect on grant take-up

As shown in Table 3, the take-up rate for municipalities is virtually 100%. Therefore, it is not really meaningful to study the effect of being entitled to the higher grant on grant take-up for this group of providers. However, for completeness we show the result for municipalities in Figure A1 and as expected the estimate is very close to zero. The more interesting group in terms of grant take-up behavior is instead the private providers. In the remainder of the paper, the analyses are therefore restricted to the private providers. In Figure 4, we study how private providers' grant take-up is affected by a tripling of the grant entitlement. First, just as in panel D of Figure 2, we can note that take-up decreases as we move to the right towards providers with a relatively weaker socioeconomic student composition. This negative relationship between take-up and the running variable becomes somewhat more pronounced to the right of the cutoff. More importantly, take-up discontinuously increases from around 70 % to 88 % at the cutoff. This increase is significant at the 5 % level.[19] Since the tests in Figure 2 indicated that the two intercepts would have virtually met in the absence of the higher grant entitlement for providers to the right of the cutoff, we interpret the 18 percentage point increase in take-up as a causal effect of the tripling of the grant

[19] Using standard errors clustered at the provider level rather than robust standard errors gives slightly larger standard errors: 0.0937 instead of 0.0769. This pushes the p-value to just above 5 % (0.056).

entitlement.[20] Scaling this effect with the discontinuity in the grant entitlement per student (i.e. Figure 3b) gives an estimate of the increase in take-up from a SEK 1,000 higher entitlement per student of just over 2 percentage points.

Figure 4 The effect of the higher grant entitlement on current grant take-up for private providers



Note: The printed estimate in the figure represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

5.3 Robustness

The estimate from Figure 4 relies on a specific choice of bandwidth and kernel. In Table 4, we investigate how robust the estimate is to changes in the bandwidth and the choice of kernel (see also Figure A2 and Figure A3 for a graphical representation of the estimates).[21] In panel A, we keep the baseline uniform kernel and vary the bandwidth. The estimate from Figure 4, which is based on a bandwidth that represents 80 % of the maximum bandwidth on the respective side, is reprinted in column (1) for comparison. When the maximum bandwidth for the respective side is used in column (2), the estimate is slightly lower at 16.7 percentage points but remains significant at the 5 % level. In column (3), we let the maximum bandwidth on the right-hand side (i.e. 200) define the bandwidth on both sides. With this specification, the estimate increases substantially

[20] Note that the analysis pools data from three years. The year-specific estimates are shown in Table A1. All estimates are substantially positive but vary in size. It should also be noted that the result in Figure 4 is similar when we restrict the sample to providers that appear in the data in all five years of the grant (0.2156, s.e. 0.0659, p-value: 0.001). This restriction reduces the sample by around 7%.

[21] We keep the linear functional form constant across the different specifications. Given the low number of observations, we don't think it is sensible to estimate a quadratic relationship between take-up and the running variable.

to 24 percentage points and becomes significant at the 1 % level. Using a bandwidth that represents 50 % of the maximum bandwidth on the respective side produces an estimate that is close to the baseline estimate in column (1) but with a larger standard error (see column 4). Finally, in column (5), we use a small bandwidth that represents 25 % of the maximum bandwidth on the respective side. This specification gives an insignificant estimate of 10 percentage points. While the point estimate is markedly lower than the other estimates, the confidence interval is very wide since only 191 observations are used. As can be seen in panel E of Figure A2, the lower point estimate is driven by a relatively peculiar slope to the right of the cutoff.

When we re-estimate all the specifications using a triangular kernel in panel B, the resulting point estimates are similar but consistently somewhat smaller.[22] The estimate in column (3) becomes substantially smaller suggesting that the estimate of 24 percentage points from panel A is likely to overestimate the effect. Overall, we interpret the estimates in columns (1)–(4) as being reasonably stable at around 15 percentage points. The estimates using the smallest bandwidth in column (5) are smaller but qualitatively consistent. It can also be noted that these small bandwidth specifications give relatively sharp slopes that differ in sign on the two sides of the cutoff (and between the different kernel specifications), suggesting that the number of observations might be too low to estimate a meaningful relation between take-up and the running variable (see panel E of Figure A2 and Figure A3).

[22] With the triangular kernel more weight is put on observations close to the cutoff. The weight gradually falls as one moves further away from the cutoff so that the weight distribution forms a top exactly at the cutoff.

Table 4 Sensitivity of the estimate to variations in kernel and bandwidth

Column:	(1)	(2)	(3)	(4)	(5)
Outcome:	Grant take-up	Grant take-up	Grant take-up	Grant take-up	Grant take-up
A. Uniform kernel					
RD-estimate	0.179**	0.167**	0.240***	0.173*	0.100
	(0.077)	(0.069)	(0.092)	(0.096)	(0.129)
Observations	987	1218	370	503	191
Kernel	Uniform	Uniform	Uniform	Uniform	Uniform
Functional form	Linear	Linear	Linear	Linear	Linear
Bandwidth	534;160	667;200	200;200	334;100	167;50
Control intercept	0.701	0.735	0.662	0.667	0.705
B. Triangular kernel					
RD-estimate	0.152*	0.153**	0.135	0.148	0.087
	(0.083)	(0.075)	(0.099)	(0.104)	(0.132)
Observations	987	1218	370	503	191
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular
Functional form	Linear	Linear	Linear	Linear	Linear
Bandwidth	534;160	667;200	200;200	334;100	167;50
Control intercept	0.705	0.713	0.731	0.679	0.759

Note: The table shows estimates of β_1 from Equation (1). Column (1) uses 80 % of the maximum possible bandwidth; column (2) uses all observations; column (3) uses the same bandwidth on both sides; column (4) uses 50% of the maximum possible bandwidth; column (5) uses 25% of the maximum possible bandwidth. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level.

In the baseline analysis in section 5.2, we required the providers to have more than five students to be included in the analysis sample. Figure A4 shows estimates from specifications with varying size restrictions. Overall, while there is some variation in the estimate across different size restrictions, this analysis does not change the conclusion that private providers increased take-up of the grant by somewhere in the range of 10–20 percentage points as a result of the higher grant entitlement.

5.4 Heterogeneity

As previously noted, the first year of the Elementary school grant (2015/16) did not include a compensatory part; the grant entitlement per student was constant across providers. Thus, we have a "pre-treatment" observation of the providers' take-up behavior. Arguably, there is limited scope to increase grant take-up with higher grant entitlements for providers who claimed the grant already in the first year. Thus, the average effect on take-up documented so far is likely to be driven by providers who did not claim their grant entitlement in 2015/16. Recall from Table 3 that the take-up rate for private providers in 2015/16 was just over 54 %. We split the sample of

private providers by their take-up status in 2015/16 and estimate separate effects for the two groups. The results in columns (1)–(2) of Table 5 confirm that the effect on grant take-up is confined to the group of providers who did not claim the grant in 2015/16 (see Figure A5 for RD-graphs). For this group of providers, we see a large increase of 35.6 percentage points. Still, the effect is only significant at the 5 % level because of the low number of observations. As expected, the effect for providers who did claim the grant in 2015/16 is small and insignificant. Since the two groups of providers had similar grant entitlement discontinuities, scaling the effect by the grant entitlement per student discontinuity does not change the relation between the estimates (see the row "Effect/1,000 SEK").[23]

Another interesting dimension is whether the private provider has a for-profit motive. About 44 % of the private providers in our analysis sample are for-profit providers ("Aktiebolag"). For-profit providers might see the grant as a possibility of increasing profits, either directly by holding expenditures constant while taking out more profit (although this is in principle not allowed), or indirectly by using the funds to improve quality and attract more students and can therefore be more motivated to claim their entitlements. On the other hand, some for-profit providers might feel that the purpose and conditions associated with the grant interfere with their business model.[24] Thus, it is not straightforward to predict the pattern of this heterogeneity analysis. In addition, for-profit and non-profit providers differ along other dimensions that might be relevant for grant take-up. For-profit providers are, e.g., generally much larger. With this in mind, we split the sample by the for-profit status and present results in columns (3)–(4) (see Figure A6 for RD-graphs). We can first note that the control intercept is somewhat lower for the for-profit providers. While the increase in grant take-up is similar for these two groups of providers (18–19 percentage points), it is important to account for the fact that they have rather different grant entitlement discontinuities. Since for-profit providers, on average, have more enrolled students, fewer for-profit providers to the right of the cutoff are entitled to more than twice the basic entitlement. Consequently, the increase in take-up per each additional SEK 1,000 in the grant entitlement per student is substantially larger for for-profit providers. However, the scaled estimates are not significantly different from each other.

In columns (5)–(6), we also split the sample of private providers based on whether they are below or above median size in terms of number of enrolled students (see Figure A7 for RD-graphs).[25] Here, there is a notable difference between the control intercepts; smaller providers are much less likely than larger to claim the grant when they are only allocated the basic entitlement. One reason for this is probably that the cost of claiming the grant is relatively stable across

[23] First stage estimates and their corresponding F-values are reported in Table A2.
[24] For example, they might want to avoid receiving funding that requires a special separate documentation.
[25] We define the median within the sample of private providers.

providers of different size, or possibly even larger for smaller ones, while the overall grant entitlement increases linearly with the number of students. Thus, when the entitlement is at the basic level, smaller providers are more likely to feel that the overall grant entitlement is too low relative to the cost of claiming. In addition, there is a possibility that the cost of claiming the grant actually is higher for smaller providers. Larger providers, that often run multiple schools, are likely to have a more developed administrative infrastructure, possibly with some spare capacity, making it easier to submit grant applications without any additional adjustments in terms of, e.g., staffing or software. Smaller providers, on the other hand, might need additional staff to handle the applications. Given the baseline difference in take-up, it is therefore not surprising to see a much larger effect for smaller providers. The point estimate for smaller providers is 28 percentage points and the impact is significant at the 1 % level. For larger providers, the estimate is actually negative. However, the confidence interval is wide and the negative point estimate appears to be driven by a somewhat peculiar slope to the right of the cutoff (see panel B in Figure A7). In any case, the high baseline take-up leaves little room for a reaction to the higher entitlement.

Table 5 Heterogeneous effects by provider characteristics

Column:	(1)	(2)	(3)	(4)	(5)	(6)
Outcome:	Grant take-up	Grant take-up	Grant take-up	Grant take-up	Grant take-up	Grant take-up
Group:	2015/16=0	2015/16=1	For-profit	Non-profit	Small	Large
RD-estimate	0.356**	0.033	0.188	0.184*	0.280***	-0.044
	(0.139)	(0.066)	(0.114)	(0.103)	(0.106)	(0.105)
Effect/1,000 SEK	0.042**	0.004	0.036	0.015*	0.024**	−0.011
(fuzzy RD)	(0.019)	(0.007)	(0.024)	(0.009)	(0.010)	(0.026)
Observations	440	547	433	554	541	446
Kernel	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Functional form	Linear	Linear	Linear	Linear	Linear	Linear
Bandwidth	534;160	534;160	534;160	534;160	534;160	534;160
Control intercept	0.482	0.912	0.677	0.720	0.639	0.873

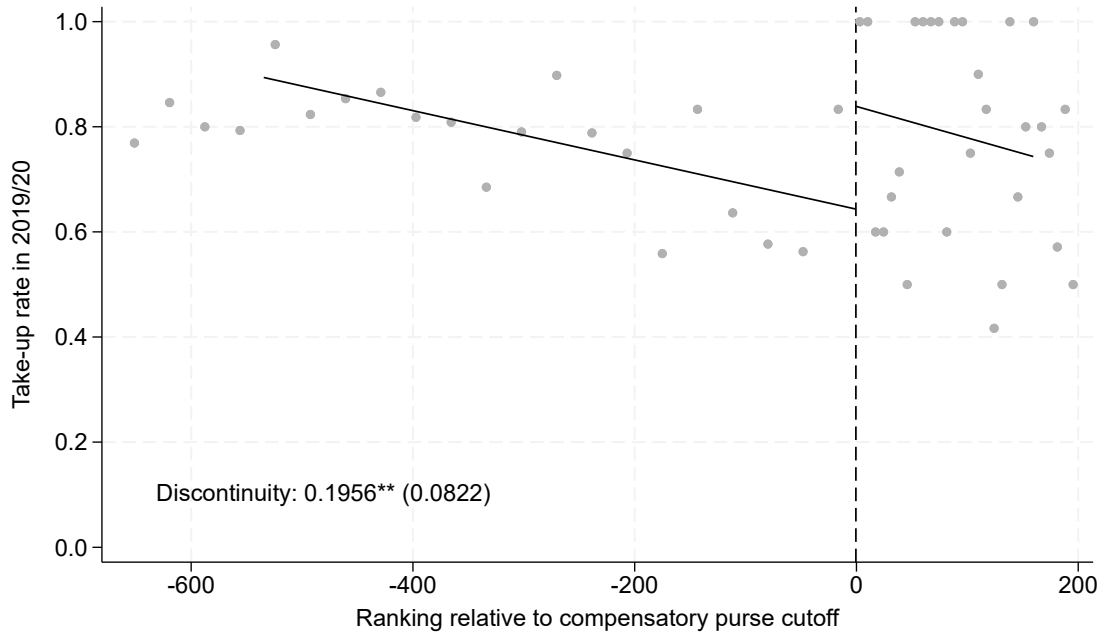
Note: The table shows estimates of β_1 from Equation (1). Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level.

5.5 The persistence of the effect

In the last year of the Elementary school grant, i.e. 2019/20, the government dropped the compensatory purse from the program. Consequently, the grant entitlement per student was the same for all providers in this year. In this section, we are interested in whether the discontinuity in grant take-up at the cutoff (see Figure 4) persists into 2019/20 when there is no longer a grant entitlement discontinuity at the cutoff. To study this question, we still use the same analysis

sample from the three rounds in 2016/17–2018/19, but instead of using take-up in the current year as the outcome, we use take-up in 2019/20 as the dependent variable. The result, presented in Figure 5, shows a significant discontinuity of approximately 19.6 percentage points. This increase is significant at the 5 % level. It is surprising to see that this point estimate actually is somewhat larger than the estimate with respect to current year grant take-up in Figure 4. However, the confidence intervals are wide for both estimates suggesting that we cannot rule out a scenario in which the increase in current year grant take-up is larger than the increase in 2019/20 take-up. More importantly, it is very clear that the discontinuity in grant take-up remains even when the discontinuity in grant entitlement is removed. This type of effect, i.e. an effect that survives even after the removal of the circumstances that caused the effect in the first place, is often referred to in the literature as a hysteresis effect (see, e.g., Rosenqvist and Selin 2023 for an example of hysteresis in benefit take-up at the individual level). One interpretation of this persistent effect on grant take-up is that providers can rely heavily on plans/applications from earlier years when submitting the plan for the current year, i.e. that having constructed and submitted a plan once reduces the cost of claiming the grant in subsequent years. An alternative explanation is that providers that were pushed to claim the grant because of the higher entitlement feel that they must continue to claim the grant, even if it is lower, in order to avoid a drastic drop in available resources from one year to another.

Figure 5 The effect of the higher grant entitlement on grant take-up in 2019/20 for private providers



Note: The printed estimate in the figure represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

6 Conclusion

A non-negligible share (around 7 % in 2023) of the funding for compulsory school in Sweden is distributed to education providers, i.e. the 290 municipalities and the roughly 500 private providers, through non-competitive central government grants that the providers actively need to claim by submitting relatively detailed plans for fund usage. The grants, which typically are tied to specific purposes, are a way for the central government to exercise control over various school policies in a decentralized system. However, for the grants to have an impact, the providers must claim them and not all providers do this, especially not smaller private providers (Riksrevisionen 2017). For example, in the first year of the grant program that we study in this paper, all municipalities claimed their grant entitlements while only 54 % of the private providers did so.

In this paper, we have studied how (private) providers' take-up decisions are affected by the size of the grant entitlement. We exploit a large grant entitlement discontinuity in the allocation schedule of the so-called Elementary school grant. This grant existed during the five academic years 2015/16–2019/20 and targeted education providers serving students aged 6–9 (preschool grade to grade 3). The purpose of the grant was to increase the teacher-to-student ratio in the lower grades, and to claim the grant a provider needed to submit a plan detailing strategies for how the grant money would be used to reach the objective.

In three years of the grant program, 2016/17–2018/19, the grant contained both a basic part, which allocated the same amount per student to all providers, and an additional compensatory part which was only allocated to providers with a weak socioeconomic student composition. If a provider was assessed to be eligible for the compensatory part, the provider received a compensatory grant allocation that was at least as large as the basic part for a total grant of at least twice the basic grant. To determine eligibility for the compensatory part, the government ranked the providers according to the socioeconomic composition of the students they served, with rank 1 being the weakest socioeconomic composition. Only providers up to a certain rank were eligible for the compensatory part (rank 200 in 2016/17, and 127 in 2017/18 and 2018/19), meaning that providers with just marginally stronger student composition received a substantially smaller grant allocation. For private providers, the grant entitlement per student discontinuously increases from SEK 4,200 to SEK 12,900 at the cutoff. The amounts and the discontinuity are sizable in relation to the average total cost per student which was close to SEK 100,000 at the start of the grant program in 2015.

Using a regression discontinuity design, we first find that providers at the cutoff are very similar in terms of predetermined characteristics and earlier grant take-up behavior, supporting the assumption that providers close to the cutoff are as if randomly assigned to the higher or lower grant entitlement. We then study current year grant take-up for private providers and find that it increases from around 70 % to 88 % at the cutoff. This increase is significant at the 5 % level. The effect varies somewhat across different model specifications but is almost always between 10 and 20 percentage points. Given the discontinuity in the grant entitlement per student (SEK 8,700), the baseline effect of 18 percentage points implies an increase in take-up from a SEK 1,000 higher entitlement per student of just over 2 percentage points.

In terms of heterogeneity, we can note that the effect is completely driven by providers that did not claim the grant in the first year of the program, 2015/16, when there was no compensatory part. The effect for this group, which constitutes around 45 % of the sample, is a bit more than twice as large as the overall average effect in the analysis sample. The results also show that smaller private providers react more strongly to the higher entitlement than larger providers. This is partly because private providers above median size have a take-up rate of almost 90 % already with the lower grant entitlement, thus leaving limited room for take-up responses to a higher entitlement. The take-up discontinuity is similar for non-profit and for-profit private providers, but since for-profit providers had a smaller discontinuity in the grant entitlement per student, the increase in take-up from a SEK 1,000 higher entitlement per student is larger: 3.6 compared to 1.5 percentage points.

Finally, we use grant take-up in 2019/20, when there was no compensatory part, as an outcome. Thus, we investigate if the take-up discontinuity survives even after removing the grant entitlement discontinuity that caused the take-up discontinuity in the first place. The result is very clear; the effect survives and is similar in magnitude to the effect on current year grant take-up, i.e. the effect when there actually was a grant entitlement discontinuity. We interpret this pattern as suggesting that providers can rely heavily on plans/applications from earlier years when submitting the plan for the current year. In this scenario, a temporarily higher grant entitlement will push some providers to take the costs associated with claiming the grant for the first time. In the subsequent years, these providers will continue to claim the grant even if the grant entitlement is reduced since their application costs are now lower.

Overall, the results from our analysis suggest that it is possible to increase grant take-up, for a given total grant amount, by merging smaller grants to a single larger and/or by distributing a larger share of the total grant amount to the first year of the program. Such adjustments, however, need to be balanced against other considerations such as stability of funding across years and the need for grants with very specific purposes. Finally, we acknowledge that there is remaining uncertainty about the generalizability of our results to grants in other school systems.

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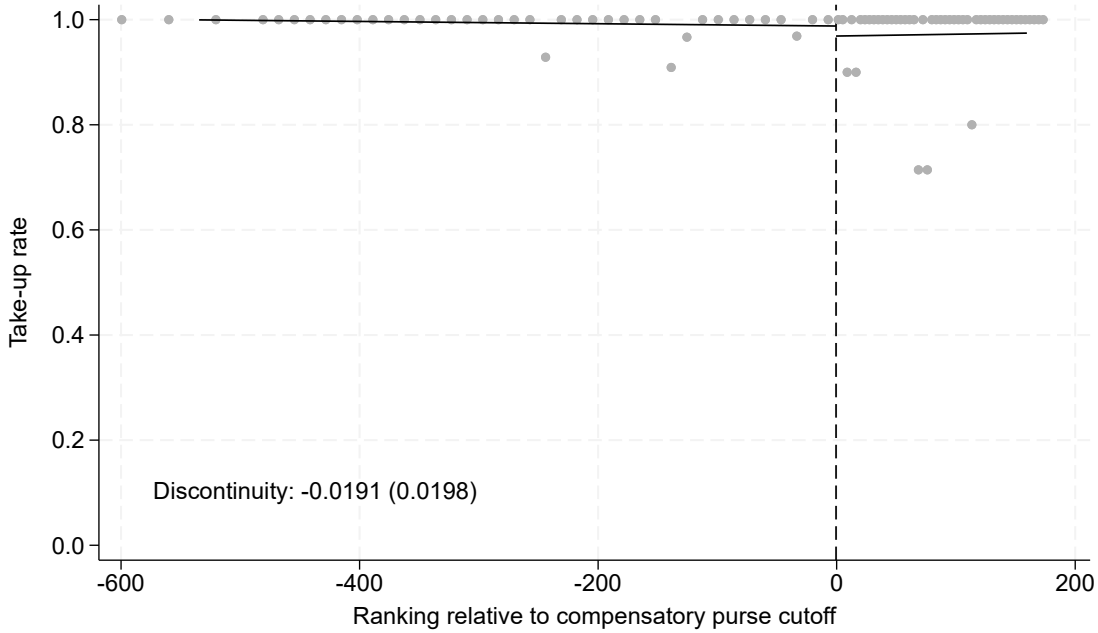
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Appendix

Figure A1 The effect of the higher entitlement on take-up for municipalities



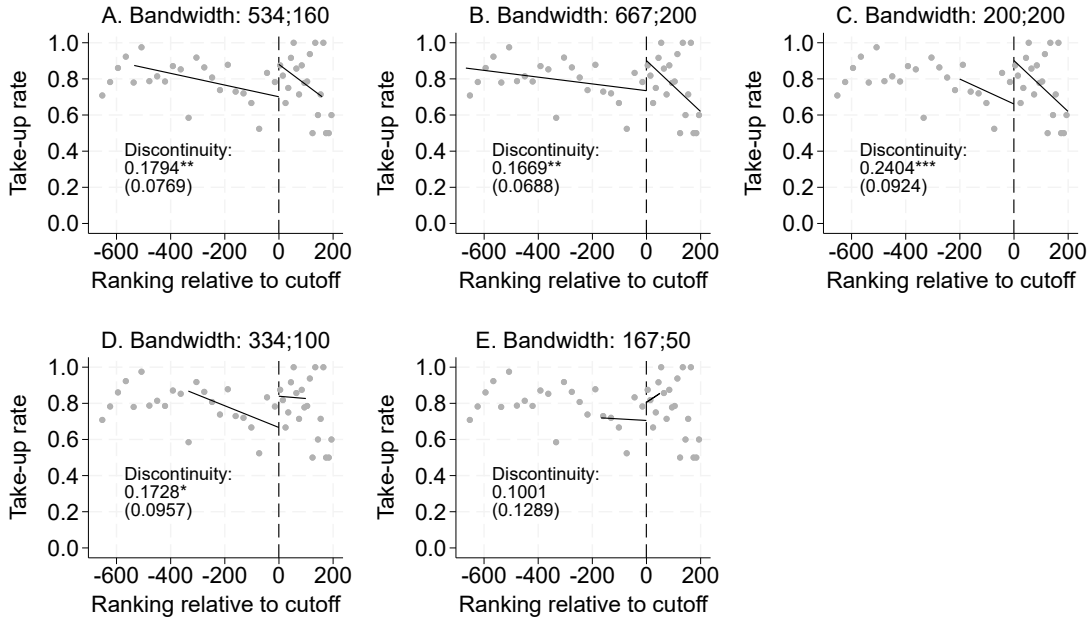
Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

Table A1 Estimates by year

Column:	(1)	(2)	(3)	(4)
Outcome:	Grant take-up	Grant take-up	Grant take-up	Grant take-up
Year:	All	2016/17	2017/18	2018/19
RD-estimate	0.179**	0.231**	0.137	0.079
	(0.077)	(0.113)	(0.139)	(0.158)
Observations	987	361	315	311
Kernel	Uniform	Uniform	Uniform	Uniform
Functional form	Linear	Linear	Linear	Linear
Bandwidth	534;160	490;160	534;125	534;125
Control intercept	0.701	0.635	0.787	0.691

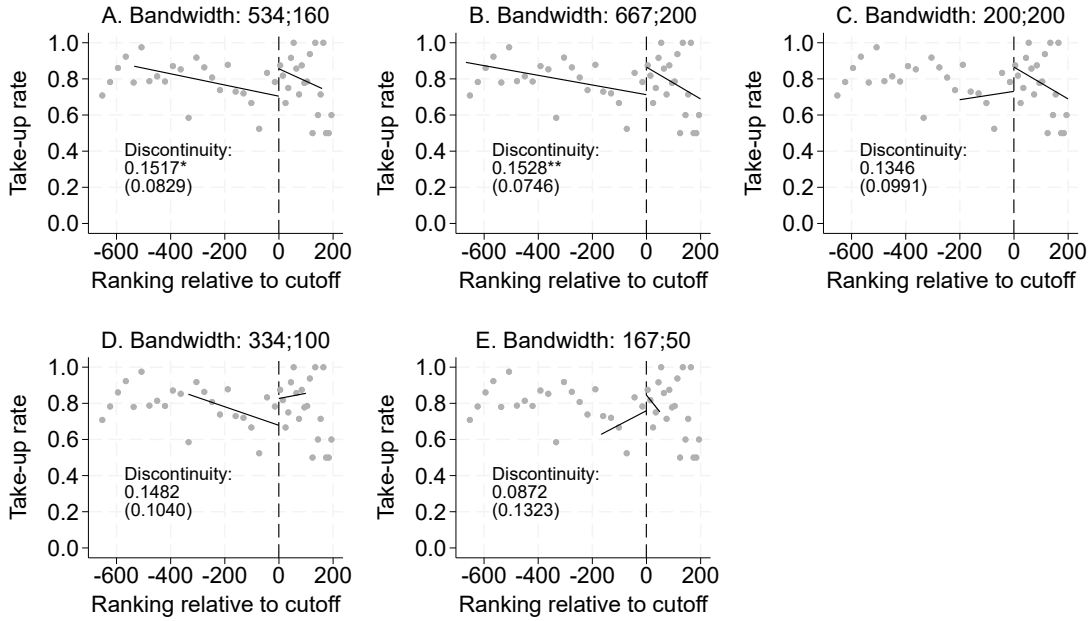
Note: The table shows estimates of β_1 from Equation (1). Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level.

Figure A2 Robustness check: uniform kernel with different bandwidths



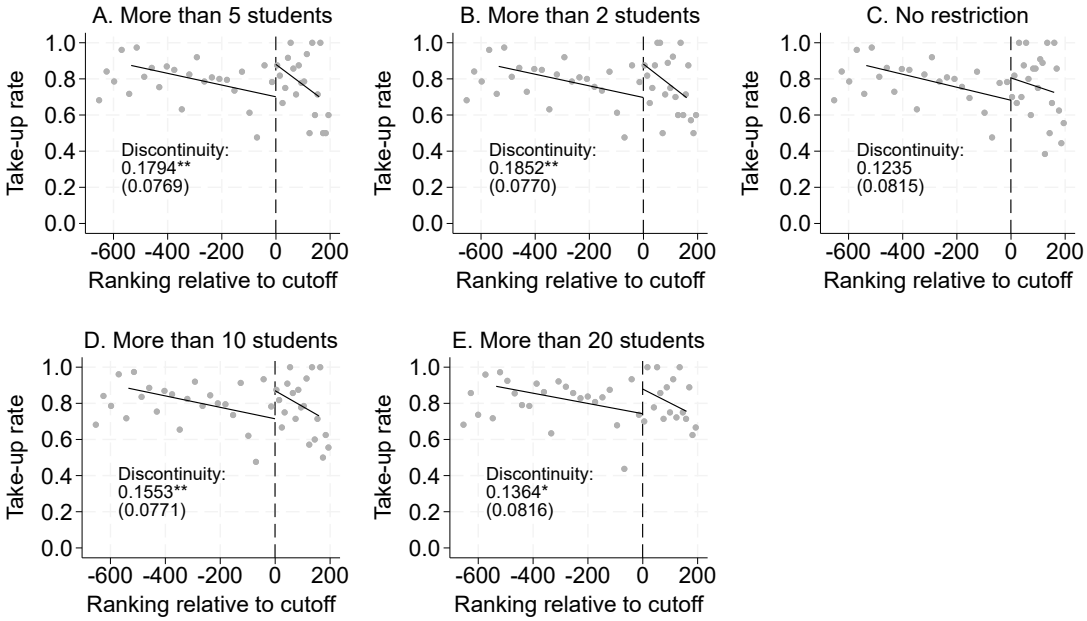
Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level. The RD-model in Equation (1) is estimated with a uniform kernel and varying bandwidths. The figures are graphical representations of the estimates in panel A of Table 4.

Figure A3 Robustness check: triangular kernel with different bandwidths



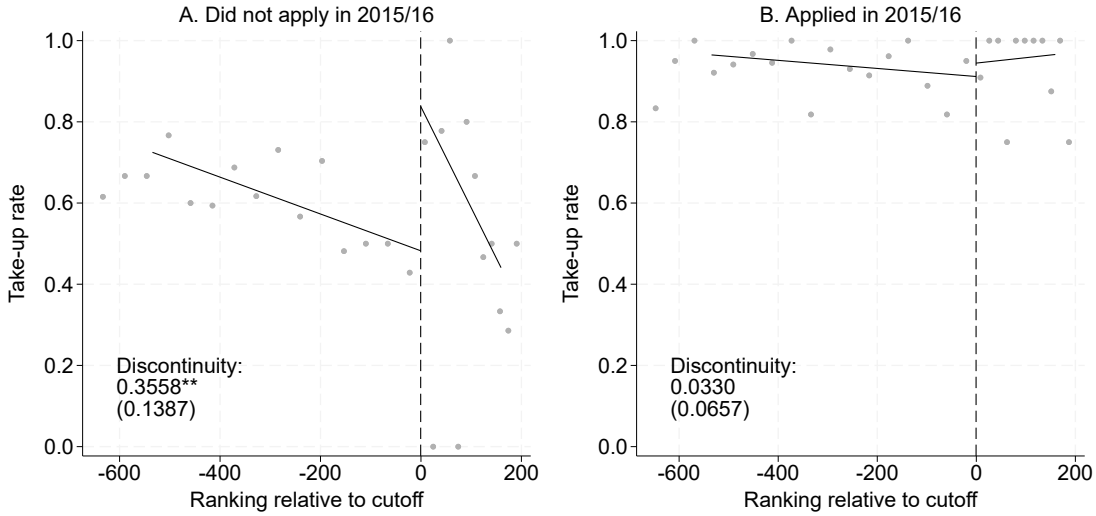
Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level. The RD-model in Equation (1) is estimated with a triangular kernel and varying bandwidths. The figures are graphical representations of the estimates in panel B of Table 4.

Figure A4 Sensitivity of the estimate to variations in the provider size restriction



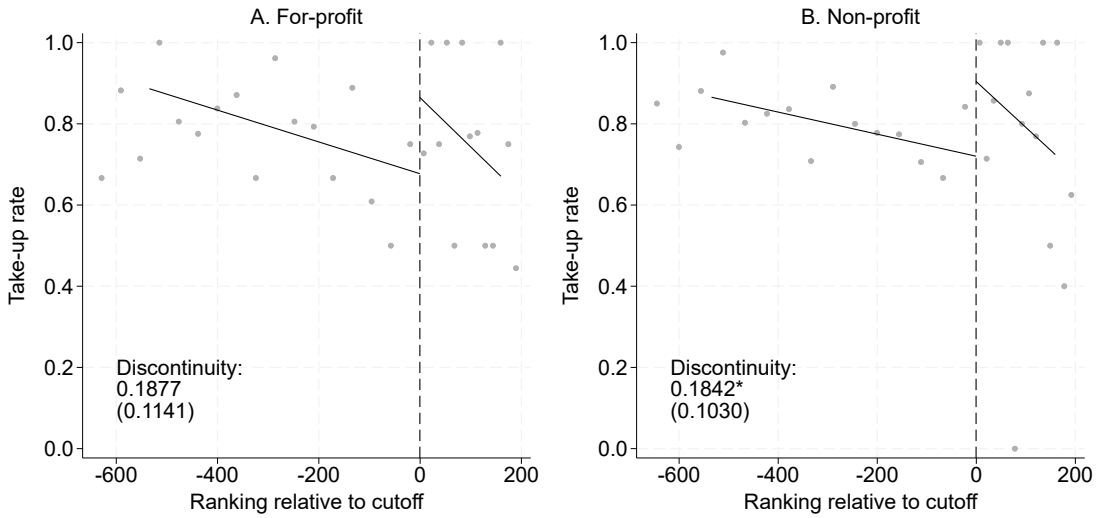
Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right).

Figure A5 Heterogeneous effects by application status in 2015/16



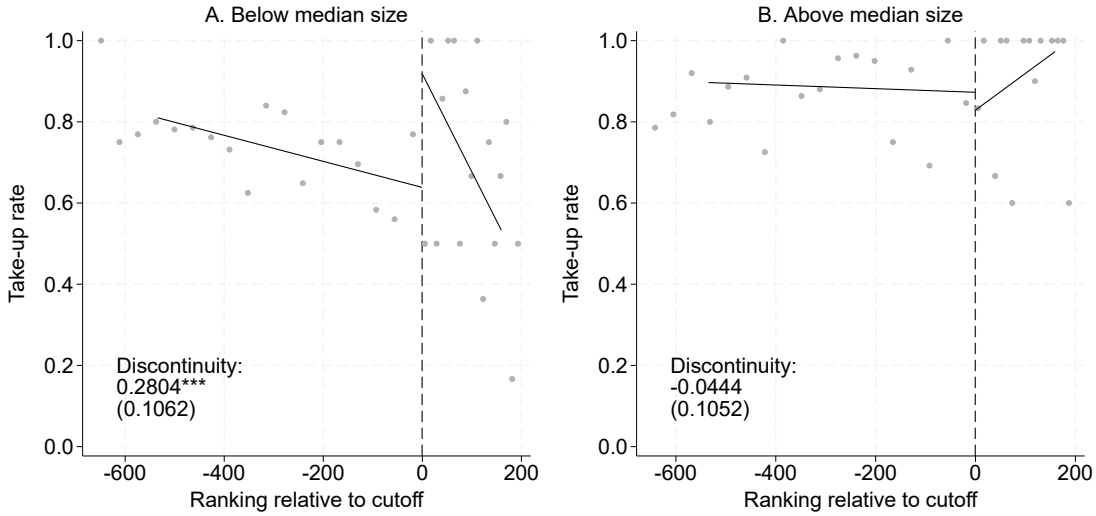
Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right). The figures are graphical representations of the RD-estimates in columns (1)–(2) of Table 5.

Figure A6 Heterogeneous effects by for-profit status



Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right). The figures are graphical representations of the RD-estimates in columns (3)–(4) of Table 5.

Figure A7 Heterogeneous effects by provider size



Note: The printed estimate in the figures represents an estimate of β_1 from Equation (1), i.e. the vertical distance between the right- and left-hand side intercept with the dashed vertical line. Robust standard errors are in parentheses. The RD-model in Equation (1) is estimated with a uniform kernel and a bandwidth that represents 80 % of the maximum bandwidth on the respective side (534 to left, and 160 to the right). The figures are graphical representations of the RD-estimates in columns (5)–(6) of Table 5.

Table A2 Discontinuities in grant entitlement per student for different groups of providers

Column:	(1)	(2)	(3)	(4)	(5)	(6)
Outcome:	Entitlement	Entitlement	Entitlement	Entitlement	Entitlement	Entitlement
Group:	2015/16=0	2015/16=1	For-profit	Non-profit	Small	Large
RD-estimate	8.42***	8.81***	5.24***	12.64***	11.45***	4.08***
(in 1,000 SEK)	(1.56)	(1.30)	(1.23)	(1.23)	(1.26)	(0.03)
F-stat	29.13	45.91	18.23	106.07	82.63	18,469.44
Observations	440	547	433	554	541	446
Kernel	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Functional form	Linear	Linear	Linear	Linear	Linear	Linear
Bandwidth	534;160	534;160	534;160	534;160	534;160	534;160
Control intercept	4.179	4.181	4.173	4.185	4.187	4.179

Note: The table shows estimates of β_1 from Equation (1). Robust standard errors are in parentheses and */**/*** refers to statistical significance at the 10/5/1 percent level.