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in Hungary

An evaluation of a conditional cash transfer program

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Abstract

This paper evaluates the kindergarten attendance allowance program in Hungary, a conditional cash transfer (CTT) program introduced in 2009 that aimed to increase kindergarten enrollment of disadvantaged children aged 3 and 4. Administration of the program was decentralized, and we make use of the substantial regional variation in program take-up across municipalities to estimate the program's effect on enrollment rates. We show modest but non-negligible effects, despite problems related to the manner of the program's implementation. We also show that the effects were significantly stronger in areas characterized by an excess supply of kindergarten slots. The results testify to the potential of CCT programs to create demand for child-care services among disadvantaged families; however, the results also highlight the importance of creating an adequate supply of kindergarten facilities where needed.

Keywords: kindergarten, conditional cash transfer (CTT) program, Hungary

JEL classification: I20, I38

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Az óvodáztatási támogatásról

Egy feltételekhez kötött készpénz-támogatási program értékelése

Kertesi Gábor - Kézdi Gábor

Összefoglaló

Tanulmányunk a 2009. januárjában bevezetett óvodáztatási támogatás hatását próbálja a bevezetést követő két év tényadatai alapján felmérni. Intézményszintű óvodai és településszintű demográfiai adatok tízéves (2001-2010) idősorára, valamint az Államkincstár 2009-2010. évi óvodáztatási támogatásra vonatkozó településsoros adataira támaszkodva, megvizsgáljuk, hogy az óvodáztatási támogatás mint feltételekhez kötött készpénz-támogatási program hatására igazolhatóan megnőtt-e 2009-2010-ben (és ha igen, milyen mértékben) a halmozottan hátrányos helyzetű családokban nevelt, 3-4 éves korú gyermekek célcsoportjában az óvodai részvétel. Becslési eredményeink pozitív hatást mutatnak ki, a hatás mértéke azonban mérsékelt. A program elemeit elemezve rámutatunk több olyan problémára és hiányosságra, amely felelős lehet a gyenge hatásokért. A becsült hatások ott a legmagasabbak, ahol az óvodai férőhelyek száma meghaladja a potenciális igényeket és jóval alacsonyabbak a férőhelyhiányos területeken.

Tárgyszavak: óvoda, feltételes készpénz-támogatás, programértékelés, Magyarország

JEL kódok: I20, I38

This paper evaluates the kindergarten attendance allowance program, introduced in Hungary in 2009. This program was a conditional cash transfer (CTT) program aimed at increasing kindergarten enrollment of children aged 3 and 4 from disadvantaged families. Eligible families received the allowance if they enrolled their children and their attendance was regular. Participation in the program was voluntary; however, the program was administered in a decentralized fashion, introducing substantial regional variation in program take-up rates. We make use of that variation in a difference-in-differences setup to estimate the effects of the program on enrollment. We estimate the effect of the program on enrollment rates of children of ages 3 and 4.

International data demonstrate that children from poor and uneducated families begin formal schooling with major deficits (*Hart – Risley [1995], Lee – Burkam [2002]*). We present evidence that Hungary is no exception. Kindergarten programs can play an important role in mitigating the disadvantages of young children raised in low-education, low-income families. Hungary has a universal kindergarten system that is open to all children of age 3 and above. For the time period of our investigation, attending kindergarten was compulsory beginning at age 5, and compliance was almost perfect. At the same time, only half of the children of the least educated fifth of mothers were enrolled at age 3. Compelling these children to attend kindergarten was the aim of the kindergarten attendance allowance program.

Using administrative data on kindergarten enrollment and population as well as on program take-up, we estimate difference-in-differences models of the effect of the kindergarten attendance allowance program on enrollment rates. The unit of observation for enrollment is the kindergarten; the unit of observation for population and program take-up is the town or village. The two levels do not match perfectly, as there are many villages without kindergartens, and many children attend kindergarten in villages or towns that differ from the villages or town in which they reside. For our analysis, we define kindergarten catchment areas, using data from a survey on commuting to kindergartens between towns and villages.

Our results show that kindergarten enrollment increased to a significantly greater extent in areas with high program take-up than in areas with low or zero take-up. This result shows a substantial increase relative to pre-existing trends. In addition, the increase is observable in the high take-up areas only, supporting the interpretation of a causal effect of the program. A simple calculation suggests that approximately one sixth of the 3 to 4-year-old children supported by the program enrolled in kindergarten as a consequence of the program. We also show that the effect of the program was largest in areas with an excess supply of kindergarten slots. This result

highlights the importance of creating adequate supply to meet the increased demand that arises from a conditional cash transfer program.

The remainder of the paper is organized as follows. The next section presents evidence of a deficit among disadvantaged children in terms of kindergarten attendance in Hungary before the program and suggests that both supply and demand factors were responsible for this deficit. We then provide a brief overview of the administrative rules regarding the kindergarten attendance allowance program. The next section describes the data and the measurement strategy used. We then show the results of the program evaluation analysis. A final section concludes.

EARLY CHILDHOOD DEFICITS AND KINDERGARTEN ATTENDANCE IN HUNGARY

The Hungarian data are in line with international surveys (*Lee–Burkam* [2002], *Neuman* [2006]): children from poor families amass significant cognitive deficits before reaching school age. Convincing evidence is provided by a nationally representative, longitudinal survey of approximately 5,000 first-grade students, launched in the fall of 2003 by the Szeged University Research Group on the Development of Competencies¹ (*Table 1*). In the group most likely to include children from poor and uneducated families – where mothers have not completed more than 8 years of schooling – we find that measured skills lag behind those of the overall population by an average of 0.5-1.5 standard deviation units.

There are various reasons why young children amass such significant skill deficits. *Brooks-Gunn and Markman* [2005] review the international literature, and *Zita Réger* [1995] describes the problem in the context of Roma children's difficulties in school. Kindergartens with strong educational programs can play an important role in reducing such differences in school readiness.

¹ Led by Benő Csapó.

Table 1

Basic competencies measured in the first grade (November) of elementary school: deviations from the main average, measured in standard deviation units, computed for the sample of the given test (Szeged University Research Group on the Development of Competencies, longitudinal study, 2003, N = 5138)

Skills	Mother's education					
	Grades 0-7	8 th grade	Vocational training	High school diploma	College (BA)	University diploma (MA)
Social skills	-1.21	-0.45	-0.07	0.11	0.43	0.55
Basic arithmetic	-1.39	-0.49	-0.12	0.25	0.40	0.63
Empirical reasoning	-0.97	-0.43	-0.09	0.21	0.45	0.55
Relational vocabulary	-1.04	-0.48	-0.09	0.15	0.39	0.47
Fine motor skills	-0.85	-0.33	-0.10	0.13	0.30	0.42
Average of basic skills	-1.51	-0.55	-0.12	0.23	0.49	0.75
Distribution of students	3%	17%	28%	33%	13%	6%

Source: *Józsa* [2004], calculated on the basis of tables 2 and 4.

Based on data from the 2006 Hungarian Assessment of Basic Competencies, administered to a full cohort of 4th graders, Table 2 shows that students from poor and uneducated families who attended kindergarten for longer periods of time achieved significantly better results. Among poor children with mothers with 0 to 7 years of education, the difference between children who spend 3 to 4 years in kindergarten and children who spend 2 or fewer years in kindergarten is 30 percent of a standard deviation. The difference becomes smaller as we compare children with more educated mothers. Although a lack of exogenous variability prevents us from establishing causal relationships, the results are consistent with the hypothesis that longer kindergarten attendance could mitigate the consequences of initial deficits. The results also suggest that the more disadvantaged are children, the greater the potential benefits of kindergarten education.

Table 2

Standardized test scores* of 4th grade children from poor and low-education families, according to the mother's education and length of kindergarten attendance (2006 National Assessment of Basic Competencies)**

Mother's education	Years of kindergarten attendance			Total	Difference of columns 1 and 3 [in st. dev. units, %]
	Under 2 years	2 years	3 or 4 years		
Grades 0-7	-1.22	-1.03	-0.92	-1.02	30%
8 th grade	-0.89	-0.75	-0.61	-0.67	28%
Vocational training	-0.49	-0.35	-0.27	-0.29	22%
High school diploma	-0.10	-0.15	-0.04	-0.05	6%

* The average values of 5 competency tests standardized to mean 0 and standard deviation 1. Competencies tested: (i) reading, (ii) writing, (iii) arithmetic, (iv) systematic reasoning, and (v) combinatorial reasoning. The group of József Nagy and Tibor Vidákovich developed the tests.

**All families included here receive regular child protection benefits, and the fathers' maximum educational attainment is a high school diploma (if there is a father in the household).

Although more disadvantaged children appear to benefit disproportionately from attending kindergarten, they attend for fewer years. We summarize the most current data on kindergarten attendance in Table 3. The source of our data is the 2005 Hungarian micro-census.² According to these data, two-thirds of 3-year-olds and almost half of 4-year-olds whose mothers have not completed 8 years of school do not attend kindergarten. This ratio is somewhat better, but still quite high, for children of mothers who have completed 8 years of schooling: more than one-third of 3-year-olds and 15% of 4-year-olds do not attend kindergarten.

We face an unusually clear public policy task. Increasing kindergarten attendance of children from the most disadvantaged families is likely to benefit the development of such children. To appreciate the magnitude of the task, let us make a simple estimate. If the public policy goal is for 3- to 4-year-olds from uneducated families to attend kindergarten at the same rate as 3- to 4-year-olds whose mothers have finished vocational training (i.e., 78% of 3-year-olds and 93% of 4-year-olds), then – considering that the cohort of children born per year is approximately 100,000 – approximately 10,000 additional 3- to 4-year-olds would attend kindergarten.

² The data of the 2011 Census are not available at present (Summer 2013).

Table 3

Percentage of children *not* attending kindergarten, according to children's age and the mother's education

Children's age (years)	Mother's education					Total
	Grades 0-7	8 th grade	Vocational training	High school diploma	University diploma	
3*	71	38	22	19	20	27
4	45	15	7	7	5	10
5	11	6	3	4	2	4
6**	5	3	1	3	3	2
Distribution of 3- to 6-year-olds	4%	26%	24%	31%	15%	100%

Source: 2005 micro-census.

* According to our own calculations from the 2008 wave of the Hungarian Household Budget survey, 6.3% of 3-year-olds attend nursery school instead.

** This row shows the percentage of 6-year-olds who *attend neither kindergarten nor school*.

Both supply and demand factors may prevent these 10,000 3- to 4-year-olds from attending kindergarten. On the supply side, availability or capacity of kindergartens may be inadequate. On the demand side, even if kindergartens were available in adequate capacity, the most disadvantaged families may be less likely to enroll their children. Supply can be measured by the availability of kindergarten slots reported by kindergartens for each year covered by the institutional data (for more details, see the Data section) divided by the population of the relevant age group. Because the geographic definitions of the two data sources do not match (many children commute to kindergartens located outside their villages or towns of residence), we created catchment areas that are closed to commuting. For more details, see the Data section.

Table 4 shows the percentage of children who attended kindergarten for 2 years or less, broken down by the relative kindergarten supply indicator of the area where they reside (in five equal-sized categories) and the level of education of their parents. These estimates are calculated for 1998 to 2000 to match the data on parental education and the length of kindergarten enrollment that we calculate from the 2006 sample of 4th graders provided by the Hungarian Assessment of Basic Competences (the 4th graders in 2006 were 4 years old in 1998 to 2000).

Table 4

**Percentage of students who attended kindergarten for 2 years or less, broken down by the relative kindergarten supply indicator in the area of residence at age 4 and parents' education
(2006 National Assessment of Basic Competencies, 4th grade students; estimates for 1998 to 2000)**

Five equal-sized groups of students, based on the value of the relative kindergarten supply indicator* in the area of residence at age 4		Parents' education**				Total	Difference of columns (1) and (3)
		Grades 0-8	Vocational training	High school diploma	University diploma		
Shortage of kindergarten slots ↓ Excess supply of kindergarten slots	Bottom fifth	39	19	11	10	20	28
	2 nd fifth	30	13	9	8	15	21
	3 rd fifth	21	10	7	6	11	14
	4 th fifth	18	8	7	5	10	11
	Top fifth	19	9	7	7	11	12
Total		25	12	8	7	13	17

* Relative kindergarten supply indicator = number of kindergarten slots / number of children aged 3-6 in the municipalities of a given kindergarten catchment area.

** Neither parent has completed more schooling than the values given.

The total column in the table indicates that the shortage of kindergartens limits attendance in all social groups. The last column of the table shows that the children of uneducated parents have lower kindergarten attendance rates in every category of kindergarten supply, including in areas with excess supply. However, the more severe is the shortage of kindergarten slots, the larger is the kindergarten attendance deficit of children of uneducated parents. This fact may indicate that, where supply is inadequate, the children of higher-status families drive out the children of lower-status families. Taken together, the figures indicate that both supply and demand factors are at work in the low attendance rate of low-status children.

The evidence presented above indicates the need for a complex intervention policy. Such intervention must address both supply- and demand-side problems. On the *supply side*, additional kindergarten capacity must be established in underserved areas. Perhaps less obvious, kindergartens may encourage enrollment by decreasing the social and cultural distance between

kindergartens and poor and uneducated families.³ Other actors, such as visiting nurses and representatives of the child protection agency, may also play a role in improving relationships between kindergartens and families. Transition programs for the children should be established with the involvement of the affected parents. All these recommendations are included among the policy recommendations of the Education and Children's Opportunity Round Table, prepared for the government in 2008 (see *Havas* [2008], 135). Although the necessity of these measures has been broadly acknowledged since 2004 (see *Havas* [2004]), there has been almost no progress on these issues over the past decade. This lack of progress is particularly problematic in light of the fact that the education authorities had many billions of euros from EU sources at their disposal, money that could have been used to fully implement the necessary kindergarten construction and expansion program within a few years.⁴

On the *demand side*, strong monetary incentives may induce poor and uneducated families to enroll their children in kindergarten as early as possible (ideally at age 3). While free of charge in principle, kindergarten imposes costs that may be large for the most disadvantaged families. These expenses can act as an obstacle to kindergarten attendance for those who most need it.⁵ The kindergarten attendance allowance program was created in 2009 to provide monetary incentives for, and compensate for some of the extra costs of, kindergarten attendance of the poorest Hungarian children.

THE KINDERGARTEN ATTENDANCE ALLOWANCE PROGRAM

The Education and Children's Opportunity Round Table recommended the introduction of a kindergarten attendance allowance in 2008. The government accepted this recommendation and introduced the program in January 2009. However, the implementation of the program was far from ideal, and government action did not mitigate the constraints on supply in underserved areas. The program was ended in 2013, with new legislation introduced that makes kindergarten attendance compulsory for every child starting at age 3.

³ "Another reason why the children of poor and uneducated families are not enrolled in kindergarten at age 3, and why their attendance is irregular, is that there is a mutual lack of trust between the kindergartens and the parents. Parents are afraid that their children will find themselves in a foreign and hostile world where they will be looked down upon and discriminated against. The kindergartens worry that these children will cause insurmountable problems. This is why parents do not insist on enrollment or regular attendance and why the kindergarten makes no effort to change the status quo." (*Havas* [2004], 13)

⁴ These projects would also have had a budgetary impact due to increased maintenance costs.

⁵ "The prices charged by kindergartens for meals, other contributions (for instance, for field trips), the provision of appropriate clothing for different seasons, the acquisition of bedsheets for the afternoon nap, etc., represent big financial burden to poor families that they are often reluctant to hasten their children's enrollment for that reason." (*Havas* [2004], 11-12)

The 1997/XXXI law on child protection (Gyvt.) was modified to introduce a kindergarten attendance allowance for eligible families that met specific conditions beginning January 1, 2009. The details of the new legislation were established in Gyvt. 20/C and in government directive 149/1997 (IX. 10.) 68/F–L. The legislation establishes the following aspects of the program: eligibility, terms and conditions, amount of the allowance, and form and distribution of payments.

Poor and uneducated families were eligible for the benefit if parents enrolled their child in kindergarten at ages 3 or 4. Poverty was defined as eligibility for a child protection subsidy, which was determined by means testing at the level of local municipalities. Only families in which neither parent had more than 8 years of education were eligible. The child was required to attend kindergarten regularly for at least two months after enrollment before receiving the subsidy.

The first payment following the child's enrollment in kindergarten was 20,000 HUF (EUR 70) (subsidy type “1a,” as defined by the law). The second and all subsequent payments following enrollment were 10,000 HUF (EUR 35) every six months (subsidy type “1b”), in June and December. The default option was a cash payment; however, local authorities could stipulate that the first payment be dispensed in kind rather than in cash. The distribution of cash payments was required to follow enrollment by at least two months.

The program had two immediate goals. First, it aimed to increase kindergarten enrollment of 3- and 4-year-olds in the target group who would not necessarily be enrolled in kindergarten at such an early age without an incentive. Second, it aimed to induce regular attendance of children from eligible families. The program also had indirect, longer-term goals related to children's health and skills, as all CCT programs do. In addition to compelling parents to enroll their children in kindergarten at an early age, the kindergarten allowance was also intended to help parents recognize the importance of early enrollment and regular attendance to their children's development and enable them to shape parental practices accordingly. We believe that the program would have been more likely to achieve such significant changes if it included complementary elements such as activities that bring families and kindergartens closer together and the provision of various additional parenting tools (parental support groups, parent-child group activities, regular home visits to provide coaching in parenting skills, etc.).⁶

⁶ For instance, the Mexican Oportunidades (previously called Progresá), which is one of the largest CCT programs in the world, with many millions of eligible individuals, contains a number of such complementary parenting components: "Under these circumstances, interventions that seek to improve parenting practices and the quality of the home environment are likely to be particularly important. Oportunidades and some other CCTs attempt to expose parents to new information and practices by

The importance of a demand-side intervention is justified by the data. International experience (Fiszbein and Schady [2009]) shows that conditional cash transfers can create effective incentives. Thus, we can expect positive effects, particularly in terms of the immediate goals of the program.

However, as implemented, the program suffered from several problems that were likely to weaken its effects. First, the delayed disbursement of the transfer (two months following enrollment) may have weakened the incentives designed to achieve the first immediate goal of the program: enrollment of children, especially of the poorest families, in kindergarten. Second, the transfer amount was relatively small: for comparison, the monthly allowance for families with children was HUF 13,300 (approximately EUR 45) per child (for two-child families). Calculated on a monthly basis, the kindergarten attendance allowance provided an additional HUF 2,500 (approximately EUR 9) in the first year and HUF 1,700 (approximately EUR 6) in the second year. Third, the option of providing in-kind benefits as opposed to cash transfers may have weakened enrollment incentives. Fourth, supply constraints were not considered in the design. The first three problems likely weakened the effect of the program everywhere. The fourth problem further weakened the effect of the program in areas with supply constraints.

DATA AND MEASUREMENT STRATEGY

The evaluation question of this paper is the impact of the kindergarten allowance program on enrollment in kindergarten. To answer this question, we must compare enrollment in kindergarten after implementation with enrollment that would have occurred had the program not been implemented (the counter-factual outcome). Participation in the kindergarten attendance allowance program was not randomized, which means that we must conduct a *non-experimental program evaluation* to assess the effect of the program.

In particular, we use a *difference-in-differences* strategy. We compare changes in the overall enrollment rate in areas with high take-up of the program (the treatment group) with changes in the enrollment rate in areas with zero take-up of the program (the control group). We further subdivide treated areas into low-, medium- and high-participation groups by program participation rate. These groups are characterized by different levels of "treatment intensity". In addition to comparing enrollment rates by treatment intensity, we also consider differences by

conditioning transfers on participation in talks (known as pláticas). The conditioned cash helps ensure that parents attend and participate in the pláticas. However, the cash-condition package offered by CCT programs may not be enough, and a comprehensive program that relies on more active participation by social workers and others may be needed." (Fiszbein-Schady [2009], 26. See also: Ibid, 55-56)

the interaction of treatment intensity and the supply of kindergarten slots. We expect the program to have significant effects in areas where there is a sufficient supply of kindergarten slots.

We use data on program take-up at the level of municipalities (towns and villages)⁷, administrative data on age-specific enrollment in kindergarten at the level of kindergartens and age-specific data on residence at the level of municipalities. Ideally, we would have worked with enrollment rates by program eligibility age at the level of municipalities.

The data on population by residence and age are collected by the Central Office for Administrative and Electronic Public Services. This data set breaks down the permanent population of the municipalities by age on January 1 of a given year.⁸ The source of our data on the number of kindergarteners is the Public Education Agency's school- and kindergarten-level database.⁹ The unit of observation is the kindergarten, and several variables are defined at this level, including the number of children enrolled by age. The Public Education Agency's definition of age groups differs from that of the population data (namely, children reaching a certain age in a given year), a discrepancy that we corrected for in matching the data (adjusting the population data by one year). From the number of children *attending* kindergarten in a given municipality, we cannot infer the number of kindergarteners *living* in that municipality. On the one hand, not all municipalities have a kindergarten; on the other hand, children may attend kindergarten in a municipality that differs from their place of residence. Unfortunately, the administrative database that collects data at the kindergarten level does not break down numbers of kindergarteners by place of residence.

In the absence of comprehensive data on program eligibility and enrollment by place of residence, we worked with data aggregated for kindergarten catchment areas that are more-or-less closed to commuting. Ideally, all children living in a catchment area would attend kindergarten in the same area, and vice versa. For the purposes of this analysis, it is important to have a sufficient number of catchment areas and sufficient heterogeneity in program

⁷ Every village and town in Hungary is a municipality; there are over 3,000 municipalities, with populations of at least 100, in Hungary.

⁸ We particularly thank our colleagues at the Demographic Research Institute of the Central Statistical Office and Zsolt Spéder, who gave us access to the municipality-level database. The population data provide us with the denominator for the age-based kindergarten attendance rate. The numerator would be the number of children among them actually attending kindergarten; however, that information is not broken down by municipality. The data on the number of children enrolled in each Hungarian kindergarten are broken down by age.

⁹ We were given access to the institution-level data (KIRSTAT) by the statistics office of the Department of Education (thanks to Tibor Könyvesi).

participation rates across different catchment areas. We accordingly attempted to define the smallest possible catchment areas that form closed commuting systems.¹⁰

We defined the areas based on the kindergarteners' commuting data, using a graph-theory algorithm called *Breadth-first search of connected components*.¹¹ The data on kindergarteners' commuting were drawn from our own survey. We asked the notary of each municipality to identify the number of kindergarten-age children living in the municipality, the number of these children attending kindergarten, and (if there is a kindergarten in the municipality) the number of children attending kindergarten in the municipality. If some of the children attended kindergarten in different municipalities, we asked the notaries to list the three most important municipalities to which the children commute.¹² The algorithm that we used to define the catchment areas combined all of the municipalities that were connected by at least one commuter.

Defined this way, catchment areas are imperfect in two respects. First, some catchment areas may be "too large". The municipalities can be connected by chains of commuting: a catchment area can contain places that are far from one another and clearly not directly connected by commuting. For example, if the inhabitants of A commute to B, the inhabitants of B to C, and the inhabitants of C to D, then all four municipalities will belong to the same catchment area, even if A and D are far from each other. Second, data recording problems may cause some catchment areas to become "too small". For instance, a catchment area that only contains one municipality may in fact include commuters who are not represented in our database because of a lack of data or because there happened to be no commuters during the year of the survey. The latter problem is more likely with small municipalities.

We combined the 3,164 municipalities in Hungary into 1,420 kindergarten catchment areas. A significant number of catchment areas (one thousand) are composed of single municipalities, and there is one very large catchment area comprising a chain of over 100 municipalities (it includes Budapest and two other cities). We treated this large catchment area – and the few other relatively large catchment areas – no differently from all other catchment areas in our

¹⁰ For example, the existing Hungarian "micro-regions" were not suitable units for our analysis because, although they do form closed systems in terms of kindergarten commuting, few of them had no allowance recipients.

¹¹ http://en.wikipedia.org/wiki/Breadth-first_search. Many thanks to Péter Divós and Tímea Molnár for their help with the programming.

¹² We thank Klára Csányi for help from the Civil Society Relations Department of the Ministry of Interior. Approximately 200 of the 3,000 municipalities did not respond to our survey, and in a further 70 cases, no kindergarten-age child lived in the municipality. We integrated these municipalities, if they had no kindergarten, into the catchment area of the nearest municipality with a kindergarten. For lack of information to the contrary, we assumed that in the municipalities that did not respond to our survey but did have a kindergarten, all children attend kindergarten locally.

analysis; however, we also estimated the impact of the program with these cases excluded. The results were similar, regardless of whether such cases were included or excluded from the analysis.

We obtained municipality-level data on program participation from the Hungarian State Treasury.¹³ The data on the biannual money transfers include the sum transferred to each municipality as well as the number of payments made to newly enrolled children (as defined in Gyvt. 20/C § 1.a) and to already enrolled children (as defined in Gyvt.20/C §1.b). The child protection law sets the amount for newly enrolled children at 20,000 HUF and at 10,000 HUF for the other children. However, in practice, some of the children registered in category "1a" received only 10,000 HUF. This fact was likely due to the difficulty of determining which category they belonged to. For example, eligible children already attending kindergarten when the program was introduced received 10,000 HUF but were placed by the notaries in category "1a" because they were receiving the allowance for the first time. However, based on the data, we were able to calculate the number of allowance recipients in category "1a" who received 20,000 HUF and who thus *undoubtedly* represent newly enrolled kindergarteners. *Table 5* shows the national biannual monetary transfer data.

We aggregated the municipality-level program participation data to the level of our kindergarten catchment areas. We divided the catchment areas into four groups based on the 2010 participation data. The "0 participation rate" category comprised catchment areas in which no one applied for the kindergarten attendance allowance for newly enrolled children in 2010. The "low participation rate" category contained catchment areas in which 0.1-5% of newly enrolled 3- to 4-year-olds received the allowance in 2010. The "medium participation rate" category comprised catchment areas with 5.1-20% participation rates, and the "high participation rate" catchment areas had participation rates of over 20%. The 0 category is the control group, and the low, medium and high categories are the treatment groups, with increasing intensity of treatment. *Table 6* shows the distribution of the catchment areas across the four categories. The table also shows the number of 3- to 4-year olds in a given category in 2008 (the baseline year immediately preceding the introduction of the program).

¹³ We thank the Hungarian State Treasury, particularly Ildikó Kovátsné Puskás and Judit Várhidiné Kelemen.

Table 5

Kindergarten attendance allowance payments broken down by the number of payments, type of payment, and actual sums transferred, 2009-2010

Term	Number of payments according to payment type and actual sum transferred			Total number of type "1a" and "1b" payments	Payment totals, [in million HUF]
	Gyvt. 20C §(1a)*		Gyvt. 20C §(1b)		
	20,000	10,000	10,000		
	HUF/person	HUF/person	HUF/person		
2009/1	1 389	8 545	544	10 478	119
2009/2	3 305	4 210	7 814	15 329	186
2010/1	4 095	2 196	13 786	20 077	241
2010/2	4 276	1 511	15 197	20 984	253

* The law specifies that the families of newly enrolled children are to receive an initial payment of 20,000 HUF (Gyvt. 20C § 1a). However, payments of both 10,000 and 20,000 HUF were made with reference to § 1a. We only accepted the latter numbers to represent *newly* enrolled children. Source: biannual, municipality-level Hungarian State Treasury data.

As Table 6 shows, in nearly half of the catchment areas (47 %), no one applied for the kindergarten attendance allowance as a new applicant. However, these catchment areas are relatively small, containing only 12% of the 3 to 4-year-old population. There are fewer catchment areas in the low participation rate category; however, these areas represent two-thirds of the 3- to 4-year-old population (Budapest also belongs to this group). Of 3- to 4-year-olds, 18% live in medium participation rate catchment areas and only 5% live in catchment areas with high participation rates.

Table 6

Distribution of kindergarten catchment areas and 3- to 4-year-olds living in catchment areas by catchment area-level program participation rates

Program participation rates*	Number of kindergarten catchment areas	Number of 3- to 4-year-olds in 2008
0 %	667	22890
0.1 – 5 %	201	125756
5.1 – 20 %	331	34767
Over 20 %	221	9257
Total	1420	192670

* The number of children newly enrolled in kindergarten in 2010 whose families received the 20,000 HUF payment / number of 3- to 4-year-olds living in the catchment area

In addition, we used another variable in our analyses to measure supply constraints of kindergartens. We calculated this variable as the "number of kindergarten slots" (the maximum capacity of a catchment area's kindergarten facilities), drawn from the kindergarten data in the school-level administrative database, divided by the number of 3- to 6-year-olds living in the catchment area. As with the kindergarten attendance rates, the imperfectly defined catchment areas lead to some measurement error. This error is exacerbated because 6-year-olds attend elementary school at different rates in different catchment areas, which means that the denominator cannot precisely match the number of potential kindergarteners, even in theory. For this reason, we have replaced the actual catchment area-level kindergarten capacity indicators with categories based on these indicators.

ESTIMATES OF THE PROGRAM'S IMPACT BASED ON NATIONAL AGGREGATES

First, we provide an estimate of the aggregate impact of the program. We analyze 3-year-olds and 4-year-olds' national kindergarten attendance rates in the baseline year preceding the introduction of the program (2008) and in the second year of the program (2010) when initial difficulties of the program have presumably been overcome. We then compare differences in kindergarten attendance rates between the two years with comparable differences over the period between 2006 and 2008. If we assume that trends between 2006 and 2008 would have continued absent the kindergarten attendance allowance program, the difference in differences will reveal additional growth due to the program. This assumption is strong, and the results should be treated with caution. Nevertheless, we present additional results that support the interpretation of the additional change as an effect of the program.

Table 7 shows the aggregate results. According to the estimate, the program was responsible for the enrollment of approximately 900 3-year-olds and 550 4-year-olds, which sums to a total of 1,450 children. This number represents our estimate of the number of children who would not have enrolled in kindergarten if the kindergarten attendance allowance had not been implemented.

Table 7

The number of children enrolled in kindergarten as a result of the kindergarten attendance allowance program on a national level

Age	Period	Kindergarten attendance rate, %		Δ %	Δ number of kindergarten ers
		Base year	Reference year		
3-year-olds	2006-2008	72.9	73.1	0.2	160
	2008-2010	73.1	74.2	1.1	1,066
	<i>diff-in-diffs</i>	–	–	–	906
4-year-olds	2006-2008	92.6	92.5	– 0.1	–87
	2008-2010	92.5	93.0	0.5	460
	<i>diff-in-diffs</i>	–	–	–	547
3 and 4- year-olds together	2006-2008	–	–	–	73
	2008-2010	–	–	–	1,526
	<i>diff-in-diffs</i>	–	–	–	1,453

The estimated increase in enrollment of 1,453 children can be compared to the number of kindergarten allowance recipients. According to the figures in *Table 5* above, the total number of newly enrolled kindergarteners, whose families received the 20,000 HUF first payment in 2010, is 8,371. Together, these figures suggest that five-sixths of the newly enrolled 3- to 4-year-olds in the program would have been enrolled in kindergarten at this age, regardless of the allowance. However, one-sixth (1,453/8,371) of these children likely began attending kindergarten at such an early age as a *result* of the kindergarten attendance allowance program.

Table 8 shows the changes between 2008 and 2010 broken down by treatment intensity. These figures are national aggregates of participation rates in kindergarten catchment areas presented as participation rates in the corresponding categories. To compare changes in areas in intense treatment categories with changes in control areas with zero treatment, we use difference-in-differences estimates. The results show that the kindergarten attendance rate only exhibits a significant increase in the high participation rate group compared to both the catchment areas that were not affected by the program (the control group) and the other, lower-intensity treatment groups.¹⁴ Moreover, the jump in the enrollment rate in the high-intensity category is observable only after 2008; the change between 2006 and 2008 is on the order of

¹⁴ In evaluating the effects, it is also helpful to recall the data from *Table 8*, which show that only 5% of 3- to 4-year-olds (somewhat over 9,000 children) live in high-participation-rate catchment areas.

one to two percentage points in all categories.¹⁵ This result provides further evidence of a causal effect of the program on attendance rates.

Table 8

**Change in kindergarten attendance rates in 2008-2010 by treatment intensity
(catchment area-level program participation rates)**

Program participation rate*	3-year-olds			4-year-olds		
	2008	2010	Δ	2008	2010	Δ
0 %	77.2	79.4	2.2	93.1	94.7	1.6
0.1 – 5 %	72.6	73.2	0.6	93.1	92.3	-0.8
5.1 – 20 %	73.7	73.6	-0.1	90.5	93.2	2.7
Over 20 %	68.6	78.0	9.5	89.9	96.9	7.0

*The number of children newly enrolled in kindergarten in 2010 whose families received the 20,000 HUF payment / number of 3- to 4-year-olds living in the catchment area.

A PANEL REGRESSION ANALYSIS OF THE PROGRAM'S IMPACT

To obtain more credible estimates of the program's impact, we estimated fixed-effects panel regressions, using catchment area level data spanning ten years. As a reminder: the kindergarten catchment areas were defined as geographical units that can be considered relatively closed systems with respect to kindergartener commuting. The dependent variables are standardized measures of 3- and 4-year-olds' kindergarten enrollment rates. We use standardized measures because the catchment areas are measured with error, and the population data are also imperfect. As a result, the enrollment rate variables themselves are not always straightforward to interpret (there are measured enrollment rates above one, for example). In subsequent regressions, we examine the effects of interactions between the program and the supply of kindergarten locations. To maintain comparability of the estimates, we dropped 48 of the original 1,420 catchment areas, due to missing data on the supply of kindergarten locations. Thus, all regressions are based on a panel of 1,372 catchment areas.

The main right hand-side variables are the three dummy variables of treatment intensity (0.1 to 5 percent, 5.1 to 20 percent and above 20 percent) for the years 2009 and 2010. The formulae for the main right-hand-side variables are:

¹⁵ These results are available from the authors upon request.

$$\begin{aligned}
T1_{kt} &= \begin{cases} 0 & \text{if } t \leq 2008 \\ 0 & \text{if } t > 2008 \text{ \& } r_{2010} = 0\% \text{ or } r_{2010} > 5\% \\ 1 & \text{if } t > 2008 \text{ \& } 0\% < r_{2010} \leq 5\% \end{cases} \\
T2_{kt} &= \begin{cases} 0 & \text{if } t \leq 2008 \\ 0 & \text{if } t > 2008 \text{ \& } r_{2010} \leq 5\% \text{ or } r_{2010} > 20\% \\ 1 & \text{if } t > 2008 \text{ \& } 5\% < r_{2010} \leq 20\% \end{cases} \\
T3_{kt} &= \begin{cases} 0 & \text{if } t \leq 2008 \\ 0 & \text{if } t > 2008 \text{ \& } r_{2010} \leq 20\% \\ 1 & \text{if } t > 2008 \text{ \& } r_{2010} > 20\% \end{cases}
\end{aligned}$$

The baseline regression equation is the following:

$$y_{kt} = \beta_1 T1_{kt} + \beta_2 T2_{kt} + \beta_3 T3_{kt} + a_k + d_t + u_{kt} .$$

In the formula, k denotes the catchment area ($k = 1, 2, \dots, 1,372$); t denotes the year ($t = 2001, \dots, 2010$); y_{kt} denotes the dependent variable, the standardized kindergarten attendance rate of 3- and 4-year-olds; a_k denotes catchment area fixed effects; d_t denotes year fixed effects; and u_{kt} denotes unobserved heterogeneity across catchment areas and time. The variables $T1$, $T2$ and $T3$ are binary variables that measure the intensity of the program. The parameters β_1 , β_2 and β_3 measure the program's impact. The latter are difference-in-differences parameters; they measure average change in kindergarten attendance rates in the respective catchment area type between the reference period and the base period compared to the average change in the kindergarten attendance rate of the control group between the reference period and the base period. Formally: if \bar{y}_τ^i denotes the conditional expected values of kindergarten attendance rates in the i^{th} kindergarten catchment area type ($i = 0, 1, 2, 3$) in period τ ($\tau: t_o = 2001\text{--}2008, t_i = 2009\text{--}2010$), controlling for all other factors, and Δ^i denotes the differences between the reference and base periods' conditional expected values ($\Delta^i = \bar{y}_{t_i}^i - \bar{y}_{t_o}^i$), then the β_i parameters measure the differences between these differences: $\beta_i = \Delta^i - \Delta^0$. All three parameters express these effects in units of the standardized dependent variable.

Table 9 presents the results of the regression estimates. The cases are weighted by the 10-year average number of 3- to 4-year-olds in the regressions, and clustered standard errors, consistent under heteroskedasticity and serial correlation, are estimated.

Table 9

Effect of kindergarten attendance allowance in panel regressions

	Dependent variable: standardized kindergarten attendance rate	
	3-year-olds	4-year-olds
T1	-0.221 [0.081]**	-0.401 [0.068]**
T2	0.156 [0.069]*	0.005 [0.070]
T3	0.549 [0.098]**	0.303 [0.096]**
Catchment area fixed effects	yes	yes
Year fixed effects	yes	yes
Number of observations	13,451	13,449
Number of catchment areas	1,372	1,372
Within R-square	0.01	0.01

Clustered standard errors in square brackets

* significant at 5%, ** significant at 1%

The results are similar with respect to the kindergarten enrollment of 3- and 4-year-olds. Similarly to the aggregate results in *Table 8*, the estimated effects are large in the high treatment intensity areas. We observe a decrease in kindergarten attendance rates in the low program participation rate areas relative to the changes in the control (0% program participation rate) areas and a slight increase in the medium participation rate category. There is a significant increase in kindergarten enrollment rates in the high program participation (over 20 percent) category, with a difference of 0.30–0.55 standard deviation units relative to the control areas. This result indicates that the program did have a causal effect on the attendance rate.

Finally, we address the problem of supply constraints. The kindergarten attendance allowance program was intended to stimulate kindergarten enrollment in a context where there is shortage of kindergarten slots in some areas. We can hardly expect a significant impact if there are major supply constraints. Conversely, we can expect a stronger impact if there is an ample supply of kindergarten slots. Because the kindergarten catchment areas are quite heterogeneous with respect to the supply of kindergarten slots, the available data enable us to test these hypotheses.

The indicator variable used to measure kindergarten capacity is described above in the data section. Low values for this indicator indicate a *shortage* of kindergarten slots, while higher

values indicate *excess supply*. This indicator is also characterized by some measurement error in both the capacity data and the delineation of catchment areas. Thus, we did not rely on the raw kindergarten supply indicator but used five categories of supply (quintiles) to obtain a less noisy indicator.

To avoid small sample size, we combined the low and medium participation rate categories and interacted the three program participation categories with the five supply-based categories. The variable $T12$ denotes the combined low and medium categories after 2008: $T12_{kt} = T1_{kt} + T2_{kt}$. The regression equation is as follows:

$$y_{kt} = \sum_{j=1}^5 \beta_j (T12_{kt} \times S_{jk}) + \sum_{j=1}^5 \gamma_j (T3_{kt} \times S_{jk}) + a_k + d_t + u_{kt}$$

In the formula, k denotes the catchment area ($k = 1, 2, \dots, 1,372$), and t denotes the year ($t = 2001, \dots, 2010$). As before, y_{kt} denotes the standardized kindergarten attendance rate of 3- and 4-year-olds; a_k denotes catchment area fixed effects; d_t denotes year fixed effects; and u_{kt} denotes unobserved heterogeneity across catchment areas and time. The variables $T12$ and $T3$ are binary variables measuring the intensity of the program. In contrast to the baseline regression, the present regression equation includes interactions: the S_{jk} binary variables takes a value of 1 if the k^{th} catchment area falls into the j^{th} supply category ($j = 1, 2, \dots, 5$) and a value of 0 otherwise. Note that we do not enter the S_{jk} dummies in addition to their interactions, as they are absorbed by catchment area fixed-effects.

The β_j parameters measure the impact of the program in low/medium participation rate catchment areas that fall into the j^{th} supply category. For instance, β_1 measures the difference between the kindergarten attendance rate in 2009-2010 and the average attendance rate of previous years, in the catchment areas with the lowest supply of kindergarten slots and low/medium program participation rates, compared to the difference between attendance rates in the two periods in the control group (0 participation rate). Similarly, β_5 measures the difference between attendance rates in two periods, in the catchment areas with the greatest supply of kindergarten places and low/medium program participation rates, compared to the difference between the attendance rates in the two periods in the control group. Analogously, the γ_j parameters measure the impact of the program in high participation rate catchment areas that fall into the j^{th} supply category. All parameters express differences in units of the standardized dependent variable.

Table 10 reports the results. As with the baseline regressions, cases are weighted by the 10-year average number of 3- to 4-year-olds, and standard error estimates are clustered at the catchment area level to allow for arbitrary serial correlation and heteroskedasticity.

Again, the results are similar with respect to the 3- and 4-year-olds. The estimated impact is generally zero (not statistically significant) or negative in the low/medium program participation rate areas. The kindergarten enrollment rate in high program participation rate areas exhibited a significant increase in nearly all supply categories. In the areas with excess supply, this increase was generally above the average of the other catchment areas; in the 5th quintile, the estimated impact was 0.75–1.56 standard deviation units.

While the results are consistent with our expectations, they also reveal important insights. It is not very surprising that a program that stimulates demand has its largest impact when there are no supply constraints. However, it is surprising that kindergarten attendance rates increased in areas with high program participation rates, despite supply constraints. This result suggests that the cash incentive has an effect on poor families' decisions to enroll their children in kindergarten, even under unfavorable conditions. Furthermore, it appears that kindergartens attempt to meet demand even when they are above capacity, leading to more overcrowding and, in all likelihood, a decrease in the quality of service. This should serve as a reminder that creating an adequate supply of kindergartens is necessary in these catchment areas.

Table 10

**Effect of kindergarten attendance allowance by the supply of kindergarten slots
(regression estimates with interactions)**

		Dependent variable: standardized kindergarten attendance rate	
		3-year-olds	4-year-olds
T12 × kindergarten supply, 1 st quintile	Shortage of kindergarten slots ↓	0.285 [0.085]**	0.090 [0.082]
T12 × kindergarten supply, 2 nd quintile		0.020 [0.068]	-0.200 [0.083]*
T12 × kindergarten supply, 3 rd quintile		-0.244 [0.083]**	-0.382 [0.075]**
T12 × kindergarten supply, 4 th quintile		-0.193 [0.154]	-0.511 [0.234]*
T12 × kindergarten supply, 5 th quintile		Excess supply of kindergarten slots	0.047 [0.265]
T3 × kindergarten supply, 1 st quintile	Shortage of kindergarten slots ↓	0.428 [0.119]**	0.279 [0.144]
T3 × kindergarten supply, 2 nd quintile		0.585 [0.173]**	0.361 [0.128]**
T3 × kindergarten supply, 3 rd quintile		0.484 [0.186]**	0.205 [0.259]
T3 × kindergarten supply, 4 th quintile		0.228 [0.189]	0.078 [0.186]
T3 × kindergarten supply, 5 th quintile		Excess supply of kindergarten slots	1.556 [0.440]**
Catchment area fixed effects		yes	yes
Year fixed effects		yes	yes
Number of observations		13,451	13,449
Number of catchment areas		1,372	1,372
Within R-square		0.02	0.01

Clustered standard errors in square brackets.

* significant at 5%, ** significant at 1%

CONCLUSION

In this paper, we evaluated the impact of the kindergarten attendance allowance program two years after its nationwide introduction on January 1, 2009. We have shown that the Hungarian data are in line with international studies demonstrating that children from poor families amass large cognitive deficits before they reach school age. However, the data also suggest that longer kindergarten attendance can effectively reduce these cognitive gaps and the resulting school achievement gaps. We have shown that 3- to 4-year-olds from uneducated families attend kindergarten for shorter periods of time than the national average. This result indicates that increasing the kindergarten enrollment rates of 3- to 4-year-olds from poor and uneducated families could effectively mitigate their subsequent school failures.

Low kindergarten enrollment rates of poor children are attributable to both supply-side factors (inadequate kindergarten capacity at some locations) and demand-side factors. Enrollment rates could be increased by kindergarten expansion and construction and by creating incentives for families in the target group to enroll their children at the age of 3. The kindergarten attendance allowance program we evaluated was a conditional cash transfer program that created such incentives but failed to address supply issues. Its implementation also suffered from additional weaknesses (delayed installments and in-kind benefits instead of cash transfers in many municipalities).

Our program evaluation was based on a non-experimental difference-in-differences approach that used rather noisy enrollment data defined for kindergarten catchment areas. Our estimates using national aggregates suggest that the enrollment in kindergarten of 1,500 3- to 4-year-olds in 2010, out of the approximately 8,400 allowance recipients also enrolled in kindergarten that year, can be attributed to the effect of the program. This result suggests that approximately one-sixth of all kindergarteners participating in the program were enrolled at age 3 as a result of the program.

Panel regressions of approximately 1,400 kindergarten catchment areas spanning ten years show that the increase in the enrollment rate was large in areas with over 20 percent program participation but not elsewhere. We have also shown that in areas characterized by high program participation rates, enrollment rates increased mostly in areas characterized by an excess supply of kindergarten slots. However, increases were also observable in areas in short supply of kindergarten slots, potentially leading to a decrease in the quality of service. This result should serve as a reminder that ensuring an adequate supply of kindergarten slots should be an important policy goal.

The 2011 modification of the public education act changed the situation. The new regulations reduced the age of mandatory kindergarten enrollment to 3 for the school term beginning in September 2012, which made the kindergarten attendance allowance's goal of increasing enrollment obsolete. However, the unsolved problems related to kindergarten enrollment remain. The cost of kindergarten attendance may represent a major financial burden for the poorest families, making it impossible to guarantee that all children will enroll, even if enrollment is compulsory. New investments will still be necessary to counter overcrowding and inadequate capacity of kindergartens.

Incentives for regular kindergarten attendance should be combined both with activities that decrease the social distance between kindergartens and the affected families and with complementary program elements that provide a variety of parenting tools. It is important for parents to actively participate in this process to ensure that they recognize the relevance of playful learning, literacy, books and frequent storytelling to the development of their children. If necessary, kindergartens should take a role in helping to develop the requisite parenting skills. Although young children from poor families may suffer from skill gaps, such gaps are not unremediable. Expert and caring support can significantly reduce these disadvantages, a fact that should be more widely recognized in kindergartens across the country. There is so much to do in this field.

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