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# Educational spillovers and parental migration

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February 27, 2015

## Abstract

This paper studies whether children with parents working abroad (PWA) influence school performance of their classmates. Based on novel data for lower secondary pupils in Poland, I exploit within-class variation in the fraction of classmates whose parents work abroad over time. Estimates suggest that the presence of PWA classmates benefits pupils. The impact is driven by PWA girls and PWA pupils whose parents graduated from high school. This positive effect is likely due to the student level interactions or increased teachers' commitment to classes with students from migrant families.

JEL-Classification: F22, I29, J13, O15

Keywords: education of adolescents, migration, peer effects

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# 1 Introduction

In 2006 the flow of temporary immigrants to OECD countries reached 2.5 million and was three times higher than the flow of permanent immigrants.<sup>1</sup> The Polish Ministry of Education also reports that 20% of Polish educational institutions surveyed in 2010 had pupils for whom one or both parents have emigrated (Tynelski, 2010). Parental migration raises concerns about the immediate impact it has on pupils as well as on their classroom peers. In another paper I consider the former.<sup>2</sup> Here, using data for Poland, I analyse whether children whose parents work abroad (henceforth PWA children) influence the school performance of their classmates. The question is very relevant and potentially important given the scale of temporary migration, the role temporary migrants play in the labour markets and the fact that many of them have left their families behind.

Large scale parental emigration raises questions about children's immediate welfare as well as long term socio-economic implications, although it is theoretically ambiguous whether the impacts of parental employment abroad are negative or not.<sup>3</sup>

These considerations are crucial because early life human capital acquisition depends on nature as well as nurture and is vital for outcomes of adult individuals.<sup>4</sup>

Parental decisions to emigrate may impact the educational attainment of a child, as emigration leads to family separation, less quality time with the migrant parent and possibly greater household responsibilities for children. At the same time, it usually results in an increase of household income, which can be directly or indirectly invested in child's education. In some cases, parental emigration may also change the perception of returns to education.

Human capital is also shaped by one's surroundings, particularly educational environment. Thus, even if a child does not experience parental emigration personally, it may be impacted by emigration of a classmate's parents.

The presence of PWA children in the class may have an effect on the performance of their peers; if parental emigration affects a child's behaviour or performance at school, it will also influence the learning environment of other children in the class and their performance.<sup>5</sup> Suppose the parental emigration improves a PWA child's performance and positively changes its attitude towards education as the income gain dominates the

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<sup>1</sup>Note that this estimate is based on statistics for 20 countries and relies predominantly on the count of permits issued and hence does not adequately capture the migration within the EU Member States where the labour movement is unrestricted. Therefore, this is likely an underestimate of the phenomenon. Moreover, it is estimated that between 20 and 50% of migrants return home within the first five years of arrival in the destination country. Family reunions are among the reasons for return (OECD, 2008). In 2011 almost 10% of the Polish households had at least one member residing temporarily abroad (The Central Statistical Office of Poland, 2013a).

<sup>2</sup>See Clifton-Sprigg (2014).

<sup>3</sup>See Dustmann and Glitz (2011).

<sup>4</sup>See Cunha and Heckman (2007); Barro (2001).

<sup>5</sup>The peer effects literature has already established that children are likely to be influenced by their school friends (Black et al., 2013; Card and Rothstein, 2007; Angrist and Lang, 2004; Hoxby, 2000).

negative effects of family separation. The child may then directly motivate peers by providing a good example. The better performance will also increase the average academic quality of the class.

Such a spillover effect cannot be determined by theory. Its sign and magnitude depend both on the impact parental emigration has on their children and on the interactions between pupils in the class. Therefore, whether PWA children influence their classroom peers is an empirical question.

Migration literature has considered the impacts parental emigration may have on children and what the contributing factors are.<sup>6</sup> To the best of my knowledge, however, no studies have addressed the question of classroom spillover. Lack of adequate data combining educational outcomes of children, their class and school allocation with the migration history in the family may be one of the reasons why.

However, some similarities can be sought in the literature on the immigrant peer effects and on the influence interruptions to family life have on children and their peers.

The context of analyses of immigrant peer effects differs substantially from the one I am considering as PWA children are native to the area they live in. Therefore, unlike immigrants, they do not face linguistic barriers and do not need to assimilate. However, the studies rely on similar methodology and analyse how an increase in the proportion of foreign-born pupils in the class affects the peers. Findings vary, depending on the country of study, age group, type of immigrants and measures of academic performance used.<sup>7</sup>

Since parental migration changes the home environment, which may influence children's behaviour, it can be related to the literature on disruptive or difficult children. Also here the peer effects vary, depending on the type of disruption considered.<sup>8</sup>

Peers may also have a positive impact on classmates, as found by Bobonis and Finan (2009) and Lalive and Cattaneo (2009) in their studies of the spillover effects of PROGRESA programme participation in Mexico. The authors highlight the social multiplier as one of the channels of the effect.

I created and collected a data set for the purpose of this analysis. In particular, I obtained detailed information about migration experiences in the families and their timing, family background, school allocation, classroom composition and academic progress of pupils (See Migration and Education of Children in Poland 2012 data<sup>9</sup>). The informa-

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<sup>6</sup>See Antman (2013) for the literature review.

<sup>7</sup>For example, Brunello and Rocco (2013), using PISA data for 19 countries, find that increasing the share of immigrant pupils in secondary schools negatively affects the test scores of natives. Ohinata and van Ours (2013), on the other hand, argue that, even though the immigrant children affect the learning environment in the school, they exert no negative spillover on Dutch students.

<sup>8</sup>Carrell and Hoekstra (2010) find that children exposed to domestic violence negatively influence their peers and Kristoffersen et al. (2015) conclude more generally that adding potentially disruptive children to a class lowers the academic achievement of peers.

<sup>9</sup>In this paper I rely on MECP2012 data, detailed documentation of which can be found at <https://sites.google.com/site/joannacliftonsprigg/data>. However, I will highlight all essential information related to the data in Part A of the online Appendix to this paper which can be found on

tion about the timing of migration is key for identification which exploits the within-class variation in the proportion of PWA pupils over time.

I investigate the relationship between the number of PWA pupils in the class and the individual average grade. The ordinary least squares regression results suggest that the presence of PWA pupils in the class lowers the performance of their peers. They reflect negative selection into migration and the fact that PWA children come from families with lower socio-economic background and perform on average worse at school, irrespective of parental emigration.

I introduce class fixed effects into the regression to control for time-invariant unobserved characteristics of classes which may be influencing the performance of pupils and be related to the class composition. I then find that pupils seem to benefit from the presence of the PWA peers in the class and the effect is non-negligible. A one standard deviation increase in the fraction of PWA pupils in the class is associated with an increase in the average grade by about 3% of the standard deviation. Importantly, the effect is predominantly driven by the presence of PWA girls in the class.

One particular group of influencers emerges - PWA pupils, whose parents have completed secondary education. Increasing their proportion in the class is associated with a greater increment in the average grade than when the overall proportion of PWA pupils changes. It is difficult to establish the exact mechanism behind such an outcome. One may think that these PWA children gain more from their parents' experience abroad, as better educated parents have the potential for earning higher income abroad and hence remitting more. At the same time, they may invest a higher proportion of earned income or their own time in their children's schooling. In that case, this particular group of children has the potential of sharing the positive influence with their classmates. They may also be more effective in influencing educational outcomes of others by sharing information on the value of education.

The analysis is not without limitations. The approach does not cater for situations in which time-varying changes, affecting both the average grade of pupils and the class composition, take place. I discuss such potential limitations.

I consider alternative explanations for the effect and eliminate cases in which schools reallocate resources to support PWA pupils or teachers inflate grades in classes with a higher concentration of PWA children. It is possible, however, that teachers put more effort in teaching classes with PWA pupils to overcompensate for having parents abroad. If so, it would further reinforce the positive effect.

Despite its various caveats, this analysis sheds new light on the role migration plays in human capital accumulation. It highlights the fact that impacts of migration are not limited to the affected families, but may spill over onto those surrounding them. This study also reveals heterogeneity within the group of migrants.

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<https://sites.google.com/site/joannacliftonsprigg/research>.

The migration in question differs from the migratory movements studied before. It is temporary, repeated and rather short-term in nature. Usually only one parent engages in employment abroad and remains in frequent contact with the family. Thus this paper is not only the first to look at peer effects in this context, but considers new migratory movements, which are increasingly common in Europe. As such its findings may be informative for current policy setting.

The remainder of the paper is structured as follows. In Section 2 I discuss the data and in Section 3 the empirical framework. In Section 4 I present results and in Section 5 consider explanations other than peer effect for the findings. I then conclude the analysis.

## 2 Data

I have designed and collected a survey among a group of 2822 teenagers in the final year of lower secondary school in Opolskie region of Poland. Detailed discussion of the Migration and Education of Children in Poland 2012 data (MECP2012) can be found online.<sup>10</sup>

Poland is the largest of the EU member states which joined the organisation since 2004. It has also become the largest (in absolute terms) sending area. It is estimated that over 1.2 million Poles (3.1% of the population) left the country for temporary employment abroad between 2002 and 2011 Census. Temporary emigration has resulted in a phenomenon of leaving families behind by many Poles. 9.6% of all Polish households had at least one temporary emigrant at the time of the 2011 Census, up from 3.8% in the 2002 Census (The Central Statistical Office of Poland, 2013a). Thus, Poland serves as a good case study for analysis of consequences of family separation due to migration.

### 2.1 Education system in Poland

The education system in Poland is divided into three compulsory stages: primary (children aged 7-12), lower secondary (age 13-15) and upper secondary (age 16-18/19). During the first two stages pupils follow a common national curriculum and write a competence test at the end of each stage. Tracking begins at the age of 16 when pupils apply to institutions with different educational goals. One is obliged by law to remain in full-time education until the age of 18.

The data used in this paper refer to pupils aged 16, in their final year of the lower secondary school, and record retrospectively their performance over a 3-year-period. Hence, one can follow each pupil throughout the 6 semesters he spent at the school.

At this stage most pupils are enrolled with their local school<sup>11</sup> and have limited op-

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<sup>10</sup>See <https://sites.google.com/site/joannacliftonsprigg/data>

<sup>11</sup>Schools are obliged to admit all pupils from the catchment area and are allowed to consider applications from outside the catchment area if they have spare capacity. As a result they are often highly selective towards applicants from outside the local areas.

portunity to influence their class allocation.<sup>12</sup> Nonetheless, allocation is not random.

Once created, the group does not change throughout the three years.<sup>13</sup> All classes are carried out in the same unit and pupils mostly interact at the class level. A degree of mixing takes place within the school but it has a more social character. Once allocated a group, the subject teacher also does not change, except in cases of retirement, maternity leave or illness, to ensure consistent assessment and education of pupils.

At the end of the lower secondary school pupils sit a national competence test in major subjects and are accepted to further education on the basis of their results in the national tests and the grades awarded by their schools.

## 2.2 Study area - Opolskie, Poland

Opolskie region is the smallest of 16 Polish provinces and is located in southern Poland, along the border with Czech Republic, as well as in close proximity to Germany, with a population reaching just over 1 million inhabitants. According to the National Statistical Office of Poland, the registered unemployment rate in the area in 2012 was 14.4% (compared with 13.4% for Poland as a whole) and the region contributed 2.1% to the Polish GDP with a GDP per capita in Opolskie equal to 80.1% of the Polish GDP per capita (The Central Statistical Office of Poland, 2013b).

Opolskie has been historically the highest out-migration region of Poland. The reasons behind the significant outflow of population from Opolskie are numerous and include amongst others historical, ethnic, cultural, political and economic motives.

With 107 985 residents of Opolskie residing *temporarily abroad for at least 3 consecutive months*, the region had the highest proportion of temporary emigrants per 1000 inhabitants in the entire country in 2011. Of them 94.5% emigrated to other EU countries, almost 62% to Germany. Resultantly, 17.8% of all households in the region had *at least one emigrant* at the time of the 2011 Census.

73% of temporary migrants have left Poland to work abroad. Of those, almost a third were seeking better wages and 31% could not find employment in Poland prior to departure (The Central Statistical Office of Poland, 2013a). Jończy and Rokita-Poskart (2013) estimate that in 2010 12% of the total population of Opolskie were working abroad and on average spent 3.9 months of the year away. They earned approximately PLN 5.9 billion abroad and remitted PLN 4.2 billion. The remitted funds amounted to 1.2% of Opolskie's GDP in 2010.

Focus on the area increased the likelihood of the migrant group in the sample being sufficiently large to obtain statistically significant results in regressions.

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<sup>12</sup>Some schools allow pupils to name their preferred classmates but the request is not always granted and there is no scope for a coordinated action of parents to create a favoured class.

<sup>13</sup>Exceptions are cases when a pupil needs to repeat a year, moves away from the area, etc. I discuss the frequency of such cases and threats they pose to validity of the results in Section 5

## 2.3 How the data was collected

There are 140 lower secondary schools for pupils aged 13-16 in Opolskie.<sup>14</sup> At the time of the study they educated approximately 9 500 16-year-olds. Due to financial and time constraints of the project, 114 largest schools were contacted with a request to participate in the study; of those 52 participated.<sup>15</sup>

Data was collected, shortly before the end of school year, in June 2012 via a short questionnaire in Polish to students and school management.<sup>16</sup> Additionally schools provided a time series of data on school performance, behaviour and attendance of the respondents; some also released data on respondents' performance in the national tests in Polish language, maths, history, sciences and foreign languages.<sup>17</sup>

Students have been asked about their age, gender, nationality, as well as family situation, i.e. number of siblings, birth order, age of siblings, who they live with, parents' age, education level and employment status. They have also been asked about participation in any extra-curricular activities, plans to attend university and emigrate. Lastly, they have been asked whether any member of their close family (mother, father or sibling) has emigrated. Children from emigrant families were then asked additional questions about the destination country, period of absence of the parent, frequency of contact with the emigrant parent and whether they have experienced an increase in household responsibilities due to emigration. The respondents have not been asked about the household income as they might have been unaware of the exact financial situation in their families and because it would have caused a controversy, potentially leading to less schools participating in the project. Thus the only indication of the family social status can be drawn from the information about parental employment and education level.

Schools also shared their impressions of the migration problem within families and its impact on pupils. The management of schools indicating existence of large migration in their community, have declared observable problems with behaviour, motivation and school attendance of pupils whose parents emigrated.

The questionnaire responses were matched with the information provided by the school regarding respondents' performance.

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<sup>14</sup>After exclusion of schools for adults and for children with disabilities.

<sup>15</sup>62 schools declined participation, mostly indicating timing of the project (close to the end of the school year) as well as the sensitivity of the issue to be investigated as a reason for their refusal to cooperate.

<sup>16</sup>For the English translation of the pupils' questionnaire see Appendix, Part A.

<sup>17</sup>School management have been informed of the aim of the data collection when agreeing to participate and setting a suitable date for the survey to be conducted. Respondents themselves, however, were unaware of the project until the day of the survey and have been asked to answer the questions on the spot, which lowered the likelihood of them opting out of the process by not coming to school on the day of the survey. Research aims were explained to the respondents on the day to ensure informed consent and allow them to opt out.

## 2.4 Data Description and Initial Descriptive Analysis

There are 2822 respondents in the data, observed over a period of 6 semesters between September 2009 and June 2012.<sup>18</sup> All of them provided information about migration experience within their family but only 2669 gave a detailed account of its timing over the 3 year period and were included in the analysis.<sup>19</sup>

### 2.4.1 Variable definitions

I define a **PWA child** as a child who has had at least one parent abroad in a given semester<sup>20</sup> and stayed in the home country during parental emigration experience. Given such definition, one may have one or both parents abroad at the same time; moreover, a migrant parent may be absent in one semester and return to Poland in another and this change will be reflected in a change in the PWA child status.

The information about migration within the family and its timing was used to construct the main explanatory variable for the analysis - **the fraction of PWA pupils in the class**. Specifically,

$$Fraction_{-ict} = \frac{M_{-ict}}{C_{-ict}} \quad (1)$$

where  $M_{-ict}$  is the number of pupils with a parent abroad in class  $c$  in semester  $t$  and  $C_{-ict}$  is the total number of pupils in class  $c$  in semester  $t$ . I exclude person  $i$  from the count to avoid counting the effect own parent's emigration has on a child. By construction  $Fraction_{-ict}$  varies over time.

The main dependent variable is **the grade of a pupil**. The grade is taken as an average over all courses taken in a given semester and is measured at the end of each semester. It ranges from 1 to 6, with 6 being a top mark awarded to a pupil for extracurricular achievement in the subject area. Pupils who mastered 100% of the curriculum in a given semester are usually awarded 5; 1 is a fail mark. The grade is awarded internally but based on the requirements of the national curriculum for a given year. The average grade in the sample has a mean of 3.61 and a standard deviation of .851.

Before progressing to the upper secondary school, pupils write **the national exams** in the following areas: Polish language and literature, history, maths, science and foreign

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<sup>18</sup>This is true only in cases where complete information was provided in the survey and the school released a full history of academic performance. In some cases less than 6 semesters of data are available.

<sup>19</sup>The rejection of some of the observations from the dataset may influence the outcomes. In particular, it can change the educational profile of the class (i.e. the distribution of average grades) as well as introduce measurement error into the fraction by undercounting number of pupils, as well as number of migrants in the class. I run regression analyses involving alternative specifications of the fraction, based on the entire sample of 2822, and results remain unchanged.

<sup>20</sup>This implies that the parent left or was already abroad at the beginning of the given semester.

languages. They are organised nation-wide by one Exam Board and blind-graded in percentage terms. I possess information about the exam results for under 13% of the sample, which is insufficient to use for the analysis but can be used for some checks.

#### 2.4.2 How common is migration?

The migration status can be identified from two variables in the questionnaire: about family having experienced migration in the 3-year-period and the exact timing of migration. Based on having a migrant parent at any time during the observed period PWA children constitute 18% of the sample (see Table 1). The number of PWA children in the sample at given time  $t$  is lower than the overall measure.

Table 1: Emigration situation in the sample

Panel A: Pupils from migrant households (irrespective of the exact timing)			
	Absolute value	Percent	Percent
total sample (n)	2669	100	
migrants (incl. sibling)	685	26	
migrant parents - total	479	18	100
<u>Who emigrated:</u>			
only father	315	12	66
only mother	100	4	21
mother and father emigrated	64	2	13
Panel B: Average duration of parental emigration (time spent abroad during the observed 6-semester-period)			
Father's emigration			4 semesters
Mother's emigration			1 semester

Source: MEC2012

The migratory movement is father dominated and in only 64 cases a respondent indicated having both parents abroad.<sup>21</sup> Moreover, only 40 respondents stated that both their parents were away at the same time. The main receiving country in the sample is Germany,<sup>22</sup> followed by the Netherlands and the UK, which points to the fact that emigration occurs over relatively short distances with the possibility of frequent returns.

Not only do families tend to send one member at a time for emigration, but also common patterns of the movement emerge within the sample. Parental migratory movements can be grouped into four main patterns. There are parents who have been absent for at least 6 semesters, those who returned from or left for emigration during the period for which I have data. Lastly, there is a significant group of migrants who experience short,

<sup>21</sup>For that reason analysis differentiating between having one or two parents abroad is not feasible. Moreover, a low number of migrating mothers in the sample precludes an analysis of the peer effects depending on the gender of the migrant parent.

<sup>22</sup>Almost 65% of migrant mothers and 64% of migrant fathers left for Germany

repetitive spells of emigration.<sup>23</sup>

Overall, migration observed in the sample is characterised by rather short-term, circular movements, with respondents having frequent contact with the migrant parent. These features distinguish the new European migration spells from those most commonly analysed in research of cross-border families<sup>24</sup> and I expect them to have a bearing on the findings in my research.

### 2.4.3 Who are the emigrant families and their children?

Migrant and non-migrant families differ in terms of socio-demographic characteristics. Children from migrant families have on average more siblings and tend to be the younger ones in the family (birth order of 2.3 versus 1.8).

A lower percentage of mothers in emigrant families work compared to those in non-migrant families. Migrants from households in Opolskie are low-skilled with 44% of mothers and 63% of fathers having finished vocational schooling, and 36% of mothers and 29% of fathers high school. The patterns observed in the data as well as characteristics of the PWA families are in line with the 2011 Census output and the literature on Polish emigration (The Central Statistical Office of Poland, 2013a; Kaczmarczyk and Okólski, 2008). This suggests that the data should rather accurately reflect the reality and lessens any concerns about potential reporting errors respondents could have made. Measurement errors would be problematic if many and non-random.

Performance of children also differs across the two groups. Children from migrant families obtain on average 0.16 lower average grade than children from non-migrant families (see Table 2.4.3).

There is variation in the proportion of PWA children in the classes. The variable has a much lower mean than the overall number of PWA children in the sample would imply since it is based on the parental absence *in a given period of time* and varies across semesters.

The individual average grade is lower in classes with fraction of PWA pupils above median, which indicates lower performance in these classes on average and is to be expected given worse average performance of the PWA students in the sample. The standard deviation of the variable is also lower indicating smaller variation across PWA-dominated classes.

The correlation between the academic performance of children and the fraction of PWA pupils in the class is almost zero.

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<sup>23</sup>In 71 cases a parent has left, 198 parents returned and 204 parents engaged in circular migration in the observed period.

<sup>24</sup>Studies of migration from traditional sending countries like Mexico or the Philippines highlight the fact that children are often left with distant family members for prolonged periods of time with little contact with the migrant parents (See McKenzie and Rapoport (2011)). This is not the case in my data.

Table 2: Characteristics of children and households in the sample

	Migrant (n=809)		Non-migrant (n=1981)	
	mean	st.dev.	mean	st.dev.
number of siblings	1.74***	1.17	1.62***	1.12
mother's age	40.40***	5.29	41.36***	5.57
father's age	43.19***	5.81	43.90***	5.74
child's average grade	3.49***	0.83	3.65***	0.85
Mother's education	N	% of group	N	% of group
primary	16	6	229	9
vocational	122	44	793	35
secondary	101	36	769	34
tertiary	41	14	494	22
Mother works	189	69	1,542	72
Father's education	N	% of group	N	% of group
primary	11	4	213	10
vocational	168	63	1031	46
secondary	78	29	644	29
tertiary	11	4	309	15
Father works	241	92	1,855	91
% respondents female	58		51	

Source: MECP2012

Note: in the top section of the table stars indicate statistically significant difference between the outcomes across migrant and non-migrant groups. Statistical significance levels \*\*\* - 1%, \*\* - 5%, \* - 10%

Table 3: PWA children and school performance

Panel A: Fraction of PWA children at time t			
	mean	st.dev.	within variation
class level	0.06	0.08	0.03
Panel B: Average school performance			
	mean	st.dev.	within variation
individual average grade	3.61	0.85	0.28
Panel C : Classes with different proportions of PWA pupils			
	mean	st.dev.	
average grade (below median)	3.68	0.88	
average grade (above median)	3.56	0.82	
Panel D : Correlations			
Corr(average grade, $Fraction_{ict}$ )			-0.04

Source: MECP2012

Note that the descriptive statistics of the PWA families suggest that there may be a degree of negative selection into migration. For this reason I will later argue that selection into migration cannot drive the effect I find.

Table 4: A summary of arguments for representativeness of the sample

School selection into the study	
1	Not all schools participated in the study. This can be problematic if opting out not random.
2	No signs of non-random selection with respect to the local geography: <ul style="list-style-type: none"> <li>• Participating schools equally spread across the region</li> <li>• Most populous and high migration areas well captured</li> </ul>
3	Other factors, not related to migration situation in the school, influenced schools' decisions to participate.
4	No indication that participating schools were not affected or differently affected by migration than others <ul style="list-style-type: none"> <li>• Positive impacts could be driven by the fact that only schools in which children cope well with parental migration participated.</li> <li>• Schools indicated, however, that when occurring parental migration has negative impact on children.</li> </ul>
5	No indication that schools in less covered areas opted out in a non-random way. <ul style="list-style-type: none"> <li>• Areas less covered by the study do not differ in socio-economic characteristics from the rest of the region.</li> <li>• Average school performance of pupils from less covered areas does not differ from that of other pupils.</li> </ul>
6	The participant and non-participant schools do not differ systematically in terms of pupils' performance. <ul style="list-style-type: none"> <li>• I compare the average outcomes of pupils of all schools in the region in the final exam in 2012.</li> <li>• Pupils in non-participant schools performed worse than pupils in participating schools; the difference is small and statistically insignificant.</li> </ul>
Pupils' participation decision	
1	Majority, but not all pupils, participated. This can be problematic if opting out not random.
2	Not an issue on a large scale. High response rate - 2822 out of 3423 enrolled pupils participated.
3	Reasons for non-participation: <ul style="list-style-type: none"> <li>• 540 pupils absent on the day</li> <li>• 41 refused to participate</li> </ul>
4	The non-respondents had on average lower grades and missed more school. <ul style="list-style-type: none"> <li>• Impossible to establish if this is related to parental migration but it is unlikely</li> </ul>

## 2.5 Representativeness of the sample

Despite the fact that the initial descriptive statistics from the collected data match what we already know about migrant families in Opolskie, one may be concerned that the collected data is not representative of the studied population. Schools and participants can opt out of the study, which may compromise the representativeness of the sample if the non-participation is not random. In Table 4 I present a brief summary of arguments for why school and participation selection can be thought of as almost random. See

Appendix, Section A.2 for details.

### 3 Empirical framework

I investigate the relationship between one’s individual school performance and a number of pupils with at least one parent abroad as a proportion of one’s class. The preferred specification is the following:

$$Y_{ict} = \alpha + \delta Fraction_{-ict} + \beta X_{ict} + \rho_t + \eta_c + \varepsilon_{ict} \quad (2)$$

where  $Y_{ict}$  is the average grade of individual  $i$  in class  $c$  at the end of given semester  $t$ ,  $Fraction_{-ict}$  represents the proportion of students with migrant parents in class  $c$  at the beginning of semester  $t$ , excluding pupil  $i$ , and is the main variable of interest. Pupil  $i$  is excluded from  $Fraction_{-ict}$  to avoid capturing potential effect of one’s own parental emigration.  $X_{ict}$  is a set of individual level controls,  $\eta_c$  are class and  $\rho_t$  semester fixed effects. Standard errors are clustered at class level.

The parameter of interest is  $\delta$ ; it explains how the average grade of individual  $i$  in class  $c$  at time  $t$  changes when the concentration of PWA pupils in class  $c$  at time  $t$  changes, controlling for other characteristics. It is identified by exploiting the variation in the fraction of PWA pupils *within the same class across different semesters*, i.e. the change in PWA fraction in each class over time.

#### *Estimation concerns*

The estimation of spillover effects bears several concerns which need to be addressed. Firstly, certain characteristics of an individual may affect his performance at school and be correlated with the proportion of PWA pupils in the class. If so, failure to include them explicitly in the regression will result in coefficient  $\delta$  reflecting not only the pure spillover effect but also the impact of those characteristics. Therefore, I include in the regression a series of individual level characteristics to control for pupils’ observable personal or family traits which may influence their school performance.

I account for gender, as girls and boys are likely to perform differently at school and also be differently influenced by classmates.

I also include number of siblings as an explanatory variable as family size is deemed crucial for one’s school attainment (Black and Devereux, 2011) and can also act as a proxy for one’s socio-economic background. Moreover, based on the summary statistics of the data, families with migrants have on average more children. If classes are created in a non-random way and PWA children are grouped together, then the number of siblings may be correlated with the proportion of PWA classmates.

Given the lack of the household income variable in the data, to proxy for the socioeconomic background of students, the specification contains information about the parents' highest obtained education level and age. I expect children's performance to be correlated with parental education. Further, the majority of migrant parents are low-skilled; if classes are created in a non-random way, parental education level may be correlated with the fraction of PWA pupils in the class. For example, sorting weaker pupils into one class may result in grouping many PWA children together.

Since parental migration may also influence a child's school performance, I incorporate the dummy variable indicating whether pupil  $i$ 's parent was abroad in semester  $t$ . Given potential non-random class allocation and the likelihood that PWA children are grouped together, migration variable is likely to be correlated with both the pupil's average grade and the fraction of PWA peers in the class. One may be concerned whether this is a suitable variable to include for two reasons. Firstly, peers' parents' emigration may incentivise one's own parents to emigrate. Moreover, parental decision to emigrate may also be driven by a child's school performance, although I do not find evidence of that in the data.<sup>25</sup> The main results are unaffected by exclusion of this variable.

The material studied at school becomes more difficult with time. Since the pupils' performance is tracked over a 3 year period, some change in pupils' grades may be attributable to the advancement in their studies and not to other circumstances. The semester fixed effects isolate the changes in grades over time which are common to all classes.<sup>26</sup>

Class fixed effects are introduced to the specification to control for any *time-invariant* unobserved differences across classes. If such differences (due to e.g. having different teachers, smarter or less able pupils in certain classes or different resources) persisted and were correlated with the proportion of PWA pupils in the class, failure to control for them would result in a biased estimate of  $\delta$ ;  $\delta$  would capture the effect due to class composition as well as due to the class-specific features.

In particular, the assessment of pupils against the national curriculum is at the teachers' discretion as the grades are awarded internally. Hence, pupils may be awarded different grades for comparable performance by different teachers. They may also be scored relative to their classmates. The situation is particularly problematic if teachers' assessment depends on the class composition, for example on the number of pupils with parents

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<sup>25</sup>The school survey results indicate that parents often do not appreciate the potential impacts emigration may have on their children and that their decision is driven by income considerations. It is also possible to check for reverse causality in the relationship between one's own grade and parental migration decision by including leads of the parental emigration dummy in the regression. I find no evidence of the problem. The results are available upon request.

<sup>26</sup>There is, in fact, a clear pattern to the average grade over time in the sample. Each year there is a systematic improvement in pupils' grades in the second semester, when compared with the first semester of that year. Further, the gap in grades between first and second semester in each subsequent year widens.

abroad. Therefore, the grades may be correlated within classes and across time.

However, I expect that teachers are consistent in the way they assess pupils over time; for example, a lenient teacher will remain lenient over the period of 3 years. If this is the case, the differences in average grades due to teachers' subjective assessment will be class-specific and time-invariant, and therefore captured by class fixed effects.<sup>27</sup>

The interpretation of  $\delta$  coefficient may be also challenged by the existence of the reflection problem. In peer effects analysis, the individual outcomes may reflect the behaviour of the peer group due to three different types of effects: endogenous, contextual and correlated (Manski, 1993). It may be impossible to separate the endogenous effects from the correlated effects in the reduced form linear analysis.

The contextual effects are driven by the characteristics of the group one is a member of and, if they do not change over time, can be isolated by inclusion of control variables or group fixed effects.

The correlated effects, linked to the fact that an individual and the group may behave similarly due to sorting or being in similar environments, pose a bigger estimation problem.

I have claimed already that the initial class allocation may be not random as schools may group pupils on the basis of certain criteria. This is a reason for concern if pupils who perform comparably are grouped into classes together and if the proportion of PWA pupils in these classes is also high.

Various solutions to the non-random composition were so far proposed, including randomisation of peer assignment and reliance on quasi-experiments (Kugler et al., 2012), which are rare to come by. Another identification strategy is to rely on idiosyncratic variation in exposure of different cohorts to the influence within the same school (Hoxby, 2000).<sup>28</sup> Unfortunately, the exercise requires data for at least two cohorts within each school; I only observe one cohort across several schools over a period of 3 years. A third solution is to minimise sorting bias by aggregation of the data to a higher geographical area, bringing the pupil allocation across the areas closer to random (Card and Rothstein, 2007). Although this approach is feasible with the data at hand, it would change the interpretation of the results and may not be a significant improvement on the fixed effects approach in this context.<sup>29</sup>

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<sup>27</sup>Nonetheless, to check whether the average grade is a satisfactory measure of school performance I rerun the regressions using the available exam scores for the 13% subsample of pupils as a dependent variable; the results, although statistically insignificant, imply a similar relationship between the concentration of PWA peers in the class and performance.

<sup>28</sup>The method relies on the concept that, having controlled for the total number of migrant pupils in a school, their number in a given cohort is determined by random factors and hence conditioning on the variable removes a substantial portion of bias.

<sup>29</sup>The idea is that, even though students of differing abilities can sort to classes and schools within a city or county, they are less likely to do so across larger areas. Card and Rothstein (2007) firstly aggregate the data to eliminate the sorting bias by averaging the outcomes of black and white students to the metropolitan level and then take across-race differences for each metropolitan area to further control

It is highly unlikely that migration status of the family is the main determinant of the initial class composition, though, as schools have limited knowledge of the household situation of applicants. Parents may also attempt to influence school's decisions, particularly if they would like their child to go to school with a certain group of peers. Nonetheless, if the class allocation is non-random at the point of enrollment, but does not change afterwards, it can be seen as a time-invariant characteristic of the class which will be controlled for by the class fixed effects. This is assuming that the impact the initial non-random allocation has on the class is constant over time.

Frequently the correlated effects problem effectively means that the dependent variable is pre-determined by the performance of the group and that the group's performance is also determined by the individual. The specification in this paper limits the extent of the issue as I investigate the relationship between the number of PWA pupils in the class (not their performance as such) and the average grade of their classmates. The proportion of pupils with migrant parents in the class is determined by individual parental decisions to engage in employment abroad, which are unlikely to be driven by or to directly affect other children's performance in the class. The channel of impact on the other children's performance in the class is via PWA children's behaviour.<sup>30</sup>

Overall, the use of class fixed effects allows to control for the pre-determined group characteristics eliminating the time-invariant component of the reflection problem. A similar argument is put forward in academic peer effects studies of immigrant concentration and domestic violence (Carrell and Hoekstra, 2010).

### *Remaining concerns*

The approach does not cater for a scenario in which the unobserved characteristics, crucial for one's school performance, are time-varying and correlated with the explanatory variables explicitly included in the regression. Therefore, the extent to which causality

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for any across-city differences in average unobserved abilities of students which may be correlated with the control variables included in their regressions. Such a setup results in an analysis of a link between segregation and performance gap. I consider it unsuitable in this study as there is no strong evidence of segregation in Opolskie. An interpretation in terms of concentration of migrant pupils seems more intuitive. Given the argument that majority of sorting takes place prior to enrolment, the fixed effects approach should deliver similar results to aggregation.

<sup>30</sup>For the issue of simultaneous determination of outcomes to arise in this context not only the proportion of PWA children in the class would have to influence a pupil's performance but also a pupil's performance would need to somehow affect the number of PWA peers. Although it is reasonable to think that one's child's performance may influence an individual decision to leave, it is unlikely that child's peers' performance triggers migration within a family. Suppose, however, that such simultaneity arose and parental migration influenced and was in turn influenced by other pupils' grades. Then a positive  $\delta$  would indicate that having good peers is correlated with a greater number of parents emigrating. It is difficult to imagine why good peers would encourage parental migration. One possible instance may be that parents are more likely to leave their children when they are not worried about the quality of teaching and their offspring's school performance; this is a more plausible scenario in classes with better performing pupils. Nonetheless, the case seems rather unusual and finds no support either in schools' perceptions of the migration phenomenon or the literature (Ryan and Sales, 2013).

may be claimed is limited. I will discuss various such scenarios when providing alternative justifications for my findings in Section 5.

### *Alternative specifications*

The list of individual controls included in the regression presented above is by no means exhaustive and many characteristics are not captured. An alternative specification may involve including individual fixed effects, rather than a series of controls in the regression. They would isolate all individual time-invariant characteristics which may impact school performance (such as intelligence, talent, etc.), whilst also controlling for class specific time-invariant characteristics. They are unable to control for personal circumstances which may change over time and influence pupils' performance. However, if they are uncorrelated with the proportion of PWA classmates, they should not influence the estimate of  $\delta$ . It is impossible to include both class and individual fixed effects as pupils do not change classes over time. In the main specification I rely on class fixed effects, as inclusion of individual level fixed effects is more demanding on the data. Nonetheless, I present results for both specifications to show that they yield similar results.

It is still of concern that some of the omitted variables key for the analysed relationship may vary over time. In particular, the average grade at time  $t$  is likely to be largely driven by its historic values as students' performance is correlated over time. A value added specification, including lagged school performance, would capture this relationship, providing another alternative to the approaches discussed so far (Kristoffersen et al., 2015). Lagged dependent variable regressions produce similar results to those presented in this paper, although many coefficients are statistically insignificant, most likely due to the sample size issues when lagged average grade is included. Due to the space constraints, I postpone detailed analysis to Section B.2 of the online Appendix.

## **4 Results**

### **4.1 Baseline**

Table 5 contains the results for the relationship between the concentration of children with migrant parents in the class and the individual school performance described above.

The OLS coefficients in columns (1) and (2) are negative and become statistically insignificant once individual level controls and semester fixed effects are included in the regression. They suggest existence of a negative correlation between the concentration of PWA pupils in the class and respondents' academic performance, which reflects the findings in the summary statistics of worse average performance in classes with higher concentration of PWA children.

However, since these estimates of  $\delta$  may be biased for reasons previously discussed,

Table 5: Impact of concentration of PWA children in the class

	OLS		class fixed effects			individual fixed effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Fraction<sub>ict</sub></i>	-.720*	-.565	.410*	.393**	.282*	.473**	.328*	.322*	.174	.179
	(.388)	(.344)	(.234)	(.181)	(.156)	(.218)	(.176)	(.175)	(.150)	(.151)
Controls										
individual level migration	no	yes	no	yes	yes	no	no	yes	yes	no
other individual controls	no	yes	no	yes	yes	yes	no	no	no	no
semester fixed effects	no	yes	no	no	yes	yes	no	no	yes	yes
class fixed effects	no	no	yes	yes	yes	yes	no	no	no	no
individual fixed effects	no	no	no	no	no	no	yes	yes	yes	yes
No of observations	13842	10853	13842	10853	10853	10853	13842	13842	13842	13842
No of respondents	2669	2070	2669	2070	2070	2070	2669	2669	2669	2669
No of classes	159	159	159	159	159	159	159	159	159	159

Source: MECP2012

The dependent variable is the individual average grade at time t.

The main explanatory variable is the fraction of PWA pupils in a class at time t.

Other individual controls include gender, number of siblings, mother and father's age and education.

Standard errors are clustered at the class level and reported in parentheses.

Note: the difference in the number of observations in regressions which include individual controls is due to the fact that not all respondents provided the information. All individual level controls, except for the timing of migration experience, are time-invariant and drop out when individual fixed effects are included.

Statistical significance levels \*\*\* - 1%, \*\* - 5%, \* - 10%

I focus on results in columns (3) to (10) of Table 5. They are obtained from regression specifications with either class or individual level fixed effects, gradually adding other controls. Irrespective of the exact controls included, these outcomes consistently suggest that an increased presence of PWA children in the class is associated with a higher average grade. Note, however, that not all estimates are statistically significant. Exclusion of the parental emigration dummy from the regressions does not adversely affect the estimates (see columns (6) and (10)).

According to the results in columns (3) to (10), a one standard deviation increase in the proportion of PWA children in the class (equal to .075) is correlated with a .013 to .035 increase in the average grade of a pupil, an equivalent of 1.53% to 4.17% of a standard deviation of the individual average grade. This implies that adding an extra PWA pupil to a class of 20 may be associated with a 1-2.8% increase in an average grade. This is similar to the effects reported by the class size literature (2-5% of a standard deviation (Angrist and Lavy, 1999)) but lower than the effect found by Carrell and Hoekstra (2010) in their study of the impact of disruptive children.<sup>31</sup>

As mentioned in the introduction to this analysis, a positive effect would suggest that PWA pupils are benefiting from parental migration experience and, through their improved school performance and behaviour, influencing their peers. The positive impact of parental migration is likely due to the income gains from migration dominating the

<sup>31</sup>Carrell and Hoekstra (2010) report a nearly 7% of st.dev. reduction in boys' test scores as a result of adding one troubled boy to a class of 20.

negative effect of family separation, which may be mitigated by the short-term and circular nature of parental departures.

## 4.2 Heterogeneity

### 4.2.1 Gender of PWA child

I also consider the impact depending on the gender of the PWA classmate. I run an alternative set of regressions, keeping the same setup as before, but now creating two fractions of PWA pupils, depending on their gender. As a result:

$$FractionGirls_{-ict} = \frac{MG_{-ict}}{C_{-ict}} \quad (3)$$

is the number of PWA girls in class  $c$  at time  $t$  as a fraction of the overall class size and

$$FractionBoys_{-ict} = \frac{MB_{-ict}}{C_{-ict}} \quad (4)$$

is the number of PWA boys in class  $c$  at time  $t$  as a fraction of the overall class size.<sup>32</sup>

The regression results are presented in columns (1) and (2) of Table 6. They suggest that the association found in the baseline regressions is entirely due to the presence of PWA girls in the class. In particular, the results in column (1) of Table 6 suggest that an increase in the proportion of PWA girls in the class by one standard deviation ( $=.050$ ) is associated with a  $.028$  increase in the average grade, an equivalent of a  $3.3\%$  of the grade's standard deviation. There is no effect due to presence of PWA boys in the class.

This is an interesting fact on its own. I leave the analysis of the reasons behind it to future research agenda. It may, however, be linked to the differential peer influences depending on gender (Lavy and Schlosser, 2011).

### 4.2.2 Parental education matters

Given that a very high proportion of migrant parents ( $80\%$  of mothers and  $92\%$  of fathers) only completed vocational or secondary education, it is plausible to expect that the effect is driven by a group of migrants with specific characteristics.

In particular, migration experience of parents may impact children differently, depending on parental education level. For example, more educated migrant parents may be employed in better paying jobs relative to parents with a lower educational attainment, although many temporary migrants are likely to be underemployed. Further, better educated migrants assimilate quicker (Card and Rothstein, 2007), which may improve their

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<sup>32</sup>In particular,  $MG_{-ict}$  is the total number of girls in class  $c$  at time  $t$  who had a parent abroad at time  $t$ ,  $MB_{-ict}$  is the total number of boys in class  $c$  at time  $t$  who had a parent abroad at time  $t$  and, as before,  $C_{-ict}$  is the total number of pupils in class  $c$  at time  $t$ .

foreign experience thanks to exposure to different cultures, more diverse network of contacts and better access to the labour market. If better educated parents earn higher wages abroad, they are more likely to remit more in absolute terms and more money can be invested in child's well-being, including education.

Furthermore, parents' priorities with regards to their children may differ, depending on their education level (Guryan, 2004). Parents with higher educational attainment may see their children's education as very important and spend a higher proportion of income on schooling or take other steps to ensure their children perform well at school - work with them at home, etc.

If better educated parents' migration experience is reflected to a greater extent in their children's improved school performance, then these children may be also more influential in interactions with peers. They may also be better at channelling information about the importance of education and various opportunities.

I run an alternative set of regressions, splitting the fraction of migrant students in the class according to education levels of their parents. The regressions mirror the approach discussed in Section 3 but now  $Fraction_{-ict}$  is replaced with 4 different variables:  $FractionElementary_{-ict}$ ,  $FractionVocational_{-ict}$ ,  $FractionSecondary_{-ict}$  and  $FractionTertiary_{-ict}$  which are defined in the following way:

$$FractionX_{-ict} = \frac{MX_{-ict}}{C_{-ict}} \quad (5)$$

where  $X = (\text{Elementary, Vocational, Secondary, Tertiary})$ ,  $MX_{-ict}$  is the number of pupils with a parent abroad with the highest educational attainment  $X$  in class  $c$  (excluding person  $i$ ) in semester  $t$ .<sup>33</sup>

Results of the analysis, presented in columns (3) and (4) of Table 6, suggest that, among all PWA pupils, children of migrants, who graduated from high school, have positive impact on their peers. They constitute about 30% of the entire migrant group. More specifically, using estimates from column (3) of Table 6, a 1 standard deviation increase in a proportion of PWA pupils whose parents are high school graduates is associated with a .036 increase in the average grade (4.29% of st.dev.).

There is no evidence of influence by the most numerous group of PWA children, whose parents have vocational qualifications. The coefficients on other fractions are statistically insignificant, which may be partly due to a much lower representation of parents in other educational groups.

The fact that PWA children whose parents graduated from high school are the impact group suggests that the influence of migration differs, depending on the family situation. As mentioned earlier, better educated parents potentially have greater employment opportunities abroad, which may lead to larger remittances; They are also more likely

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<sup>33</sup>Alternative specifications, for example using mother's or father's education levels only, do not lead to different conclusions. This is partly due to high correlation in education levels of parents in the sample.

to reap other benefits of migration to the full, thanks to faster assimilation and greater exposure to a different culture.

They may also care about their children's education more than parents who have lower qualifications.

In such a case, arguably, I should have found an even bigger influence of PWA pupils, whose parents graduated from university. This group is, however, negligible in size and hence no significant effects emerged.

### 4.2.3 Role of migration background and gender

I also consider the roles one's family migration experiences and gender play in the class peer effect. PWA students may interact more with other PWA peers, in which case the spillover will be more pronounced within the group. Peer groups may also be formed around gender with boys interacting more frequently with boys and girls with girls.

I run the baseline specification on subsamples of PWA children, non-PWA children, females and males. I use two alternative main explanatory variables -  $Fraction_{-ict}$  and  $FractionSecondary_{-ict}$ , since I established that the PWA students with parents who graduated from high school are the influential group in this study. I only report the results of regressions including class fixed effects, individual level controls and semester fixed effects.

As can be seen in columns (5)-(8) of Table 6, it is difficult to draw any conclusions about the role of a child's own migration situation in the peer effect, because the coefficients in the regressions using PWA pupils only are statistically insignificant. This is most likely due to a small number of observations. Nonetheless, the coefficients in columns (6) and (8) may suggest that the association of the grade with PWA peer presence is perhaps stronger for PWA children.

I find no differential impacts of the concentration of PWA pupils in the class by gender (see columns (9)-(12) of Table 6).<sup>34</sup>

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<sup>34</sup>One may also consider analysis of further interactions, particularly focusing on an in-depth exploration of the associations highlighted in this section. Unfortunately, the scope for doing so is limited due to the sample size. Nonetheless, further results can be provided upon request.

Table 6: Heterogenous impacts

		Gender of PWA pupil		PWA parents' education	
	(1)	(2)	(3)	(4)	
	class FE	individual FE	class FE	individual FE	
<i>FractionGirls<sub>-ict</sub></i>	.562*** (.194)	.322* (.190)	-0.479 (.444)	-0.404 (.390)	
<i>FractionBoys<sub>-ict</sub></i>	.022 (.285)	.006 (.245)	-.031 (.228)	-.264 (.208)	
			.729*** (.327)	.682*** (.290)	
			.066 (.441)	.051 (.435)	
N	10853	13842	10853	13842	
clusters	159	159	159	159	
	Pupil's migration background		Pupil's gender		
	non-PWA pupil		Female		
	Male				
	(5)	(6)	(7)	(8)	(9)
	class FE	class FE	class FE	class FE	class FE
<i>Fraction<sub>-ict</sub></i>	.111 (.604)	.343*** (.166)	.187 (.200)	.361 (.246)	.639* (.374)
<i>FractionSecondary<sub>-ict</sub></i>	1.249 (.891)	.660* (.372)	.698** (.303)	.698** (.303)	.639* (.374)
N	10853	10853	10853	10853	10853
clusters	159	159	159	159	159

Source: MECP2012

The dependent variable is the individual average grade at time t.

The main explanatory variables

In class FE regressions the controls include parental migration experience, other individual controls (gender, number of siblings, mother and father's age and education), semester and class fixed effects.

In individual FE regressions the controls include parental migration experience, other individual controls (gender, number of siblings, mother and father's age and education), semester and individual fixed effects.

Standard errors are clustered at the class level and reported in parentheses.

Note: the difference in the number of observations in regressions which include individual controls is due to the fact that not all respondents provided the information. All individual level controls, except for the timing of migration experience, are time-invariant and drop out when individual fixed effects included.

Statistical significance levels \*\*\* - 1%, \*\* - 5%, \* - 10%

## 5 Is this really a positive spillover?

The positive association between the proportion of PWA pupils in the class and the average grade may be due to peer effects. There may be, however, other plausible explanations of such an outcome, such as a time-varying change which increases the average grades in the class and coincides with an increase in a proportion of PWA children in the class. Here I discuss briefly these alternatives. A detailed discussion can be found in Section B.5 of the online Appendix.

### *Resource and teachers' reallocation*

One concern is that PWA students' performance triggers changes in the school environment. One example is if teachers adjust their methods and expectations towards a class in response to its composition. It is a common preconception in Poland that parental emigration negatively influences children (Czeladko and Kopacz, 2008), even though there is no strong evidence that this is indeed the case. As discussed in Section 2.4, it is more likely that the observed poor performance of PWA children is due to selection rather than the impact of parental emigration. Nonetheless, if teachers think PWA children are disadvantaged and problematic, they may attempt to overcompensate the pupils. As a result, they may shift their attention solely to the PWA pupils or, more likely, become personally involved and dedicate more time and effort to classes with PWA pupils. I do not find strong evidence to suggest that the academic gain is attributed to a particular group of pupils. Specifically, there do not seem to be any losers, which would render the scenario of teachers focusing on PWA pupils unlikely. The idea of teachers' greater involvement, which positively affects all pupils, is more persuasive. The scope for such a mechanism to play a role is limited as, to the best of my knowledge, currently there are no organised schemes to support teachers of classes with specific migration background. Hence, any efforts to help PWA pupils would be individual and independent. Nonetheless, I cannot eliminate such a scenario.

Alternatively, schools may reallocate resources to support classes with a high concentration of PWA students. The increased investment of resources in PWA-dominated classes could improve pupils' performance. This is, however, an unlikely case here. Firstly, schools do not have much scope for obtaining additional financial resources beyond what is initially allocated by the Ministry of Education. Further, they are limited in the extent to which they can unevenly spread resources within the school without causing controversy around preferential treatment. Lastly, introduction of any such changes may prove challenging given the relatively short time pupils spend in the lower secondary school and the school's lack of knowledge about their family situation *a priori*.

### *Change in the local economy*

Similarly, the class environment of a pupil could change if the region faced an economic downturn, which may affect both the parental migration decision and investments in children, and hence grades. Furthermore, it could also change the availability and composition of teachers in the schools. However, there is no indication that the region was severely economically affected in the observed period of 2009-2012. Moreover, changes in economic conditions of destination countries did not discourage emigration from Opolskie and emigration flows remained steady over the period.

#### *Average grade not a good measure?*

Since the average grade may be a measure of relative performance, arguably if the performance of classmates changed in the observed period, it may also bias the estimate of interest. In particular, if parental emigration worsened the school performance of PWA children and the teachers graded pupils relative to each other, then non-PWA children's performance will appear to have improved and would not be driven by the positive spillover. Such an interpretation assumes, however, that rather than lowering the PWA child's grades to reflect the worsening in performance, the teacher rewards the other pupils, whose performance did not change but is now better relative to their peers. If this was indeed the case, then I should have found a differential impact by PWA status in which the PWA children are negatively influenced by the like peers and non-PWA children benefit.

#### *Grade inflation*

Grade inflation is an alternative explanation of the result. Perhaps the positive impact of having children with migrant parents in the class is driven by the fact that teachers become more lenient towards classes where many pupils have parents abroad.<sup>35</sup>

I cannot investigate the case thoroughly due to data limitations but I run basic regressions, which may reveal existence of correlations in this field.

Using the exam results for 13% of the respondents and information about the average grades of pupils, I look at the claim that teachers in classes with a high concentration of children with migrant parents become more lenient. In such a case I expect to see a smaller correlation between the grades awarded by teachers and the pupils' performance in the national exams. This is because grades are awarded internally, and hence subject

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<sup>35</sup>Another way of looking at this issue is to consider children's performance in the context of differences in assessment across schools or classes. Perhaps schools with many PWA pupils lower their overall standards relative to the other schools as opposed to teachers selectively inflating grades of pupils they see as disadvantaged? This explanation is only plausible if the change in standards occurred within the observed period. Any time-invariant differences, including different standards across schools, would be captured by class fixed effects I include in the regression. Hence, the question to ask is how possible it is that many schools or classes significantly change their standards over a period of 3 years. I consider it to be an unlikely scenario. Nonetheless, I follow the approach of Betts and Grogger (2003) and find no signs of differential grading standards.

to manipulation, whereas the national exam is taken by all pupils in the country and blind-graded. If grades are inflated, they will be reflecting the pupils' actual skills and knowledge to a lesser extent and the correlation with the exam results is likely to be lower. I find no evidence of that. Further details can be provided upon request.

Equally, if grade inflation took place within classes, regressions using the national exam test scores rather than average grade as a dependent variable should not support the positive association between the score and fraction of PWA pupils in the class. I rerun the analysis using the subsample of test scores as a dependent variable and find a positive, although statistically insignificant relationship.<sup>36</sup>

#### *Students' responses to the class composition*

Students or schools may have actively responded to the migration situation once the class had been put together and, as a result, changed the class composition before the survey was conducted. In this case there would be an unmeasured change triggered by the presence of PWA pupils in the class.

The scope for schools to move pupils across classes is rather limited. Dropping out or changing schools by pupils (during the three year period and prior to the survey), however, is within each family's discretion and if it occurs on a large scale, in a seemingly non-random manner, poses a significant threat to causal interpretation of the results. This is of particular concern if the change would result in an improvement in pupils' grades and coincide with a high proportion of PWA pupils in the class, thus contributing to the positive relationship I find.

I only have information about the average grades of the pupils who disappear from the register up until the point they left. Using this information, I attempt to establish how problematic their disappearance may be. Here I outline the main points, focusing on scenarios which are likely to mimic the outcomes I find.

One may be concerned that good pupils change the class or school if they have PWA classmates and believe that they will exert negative influence on them. This is only a problem if these pupils' grades were indeed negatively affected by the PWA peers. Then, upon their departure the class average grade will increase and may look as if the performance has improved. This is an unlikely case, however, because majority of drop-outs occur due to pupils' prolonged very poor performance. I confirm this in a regression analysis.

A more likely case is that poor performing students disappear from the register, either because they are badly affected by PWA peers or at least think they will be. As a result only good pupils are left in the class which leads to a finding of a positive effect of PWA pupils on school performance. I find, however, no correlation between the fact of dropping

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<sup>36</sup>The most likely reason behind the statistical significance of the results is a small number of observations.

out of school and the fraction of PWA pupils in the class and this is also confirmed by probit regression analysis. Thus, there is no evidence suggesting that pupils in classes with PWA children are more likely to drop out. Moreover, I find no indication that the average grades of pupils who drop out are influenced by the proportion of PWA children in their class; thus PWA peers' presence in their class is unlikely to have influenced their performance.

One may also be concerned that pupils dropping out of school are PWA children themselves. This is possible since PWA children have lower average grades than their peers, although one's performance must be very poor to fail a year. Alternatively, they could leave the school for other reasons, e.g. departure abroad. This is problematic if their disappearance improved the class grades or if they indeed exerted a positive impact on their peers and are undercounted in the fraction of PWA pupils in the class. In both cases the effect I find would be an overestimate of the spillover. I do not have migration information about pupils who disappeared from the register. However, there is no indication in other sources that PWA children would be overrepresented in this group. Firstly, the regional statistics record very few cases of pupils of this age leaving the schooling system altogether and moving abroad. Secondly, looking at the respondents who repeated at least a year of school, there is no evidence to suggest that a high proportion of them are PWA children. If the situation in the surveyed cohort is similar, then this should not affect the estimation results.

At the same time, disappearance of certain groups of students may lead to an underestimate of the positive effect PWA pupils have on their peers. This would be the case if PWA peers exerted a positive impact on them prior to their disappearance from the class.

Finally, I check what may be the overall impact of the dropouts on the results presented in this paper. I include all their information in the data set and repeat the analysis. This way I account for their initial presence in the class; although I still cannot control for their migration status. The results are statistically insignificant but the coefficients are similar to those found in the main analysis.

## 6 Conclusion

I analyse the relationship between the proportion of children with migrant parents in a class and the academic achievement of its pupils. To the best of my knowledge, this is a first attempt of this kind in the literature. Given the particular nature of migration in the data, which differentiates the migration experiences of families in Poland from those in traditional sending countries and which I believe is becoming common within the borderless European Union, its outcomes may be informative for policy-makers in Poland, as well as other new or candidate member states.

The unique structure of the data allows me to exploit the variation in the proportion of PWA peers within classes over time, which eliminates various estimation concerns related to peer effects analysis.

I find evidence of a positive relationship between the overall proportion of PWA children in the class and the academic performance of their peers. Further analysis reveals that PWA girls and PWA children whose parents are high school graduates are the driving force behind the association.

The positive effect, although counter-intuitive, may be thanks to the short-term, circular nature of parental migration in the sample, which lowers the burden on PWA children and potentially more effectively channels positive aspects of international experiences, such as increased income, exposure to other cultures and possibly changed perception of returns to education.

It is also plausible for PWA children of high school graduates to benefit most from their parents' migration experience and become the influencers in the group. Sufficiently educated parents may reap greater benefits of migration, including higher income and cultural gains, which they can pass onto their children. They may also value their children's education more highly and ensure that their children perform well at school despite their departure for abroad.

Despite various possible explanations, it seems most plausible that the positive influence may be caused by a genuine beneficial impact of the interaction with PWA children in the class, who are more driven and motivate their peers. It is also tenable, however, that teachers change their ways of teaching and adjust to pupils' needs when they realise the proportion of PWA children in the class.

Given the choice of the study area, questions may arise regarding the degree of external validity of these findings. Despite a very unique for Poland prolonged history of steady migration for employment over relatively short distances, Opolskie does not differ significantly from the country average in terms of its economy (The Central Statistical Office of Poland, 2013b). More importantly, students from the area have been performing comparably to the country average in national tests, since they were introduced in 2002 (Centralna Komisja Edukacyjna, 2002-2012). Despite these similarities one could argue that the commonality of migration in the area may mean that children react differently to the migration experience, seeing it as a norm, and hence the group is not representative of a broader population.

Secondly, the outflow from Opolskie can be described as steady, unlike the sudden increase in emigration across other areas of the country following the EU enlargement and opening of the foreign labour markets to Polish workers in 2004. However, if the migration outflow from other areas of Poland is maintained in the future, they may match Opolskie in migration characteristics.

Thus the findings may be valid for countries or areas characterised as developed or

middle-income which experience steady migration outflow but where migrants engage in short-term, circular and legal employment abroad over relatively short distances. As a result children in such families experience the negative aspects of parental departure to a lesser extent and reap a greater share of its benefits. The setup clearly differs from the situations considered so far, e.g. Mexican migration to the US, but may be closer to the new European reality, particularly if the migration from the new member states stabilises at a certain level and is sustained, following the initial shock.

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