Education Funding Inequality and Academic Performance Disparity between Migrant and Local Students in China

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Author Note

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Abstract

Internal migration is an unique social problem for urban governance in China One of the major issue is the underperformance of migrant children in schools, and fiscal decentralization and the Hukou system restricts them from benefiting from the equal level of education finance as their local counterparts do. How governments' differentiated provision of education fundings affects the academic performance disparity between migrant students and local students in China? Applying multilevel model, we found that after clustering two groups of students by school ids, migrant status can benefit migrant students' performance in Chinese exam, while their academic performance across three subjects can decrease due to excluding enrollment of migrants, lower quota of per-student funding, and missing information in subsidies and fiscal allocation.

Keywords: education inequality, internal migration, education funding, fiscal decentralization

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Introduction

Internal migration in China has accelerated along with urbanization since the implementation of Reform and Opening Up policy in the early 1980s. Statistics from the 7th National Census in 2020 show that over 70 million children in China have migration status, which means one fourth of Chinese child population move interprovincially or intraprovincially with their parents [1]. Education and sociology research focusing on internal migrant students found that these children have a relatively lower school achievement compared to local students without migrant status, and suffer from academic and financial difficulties, as well as alienation in public education system (Chen & Feng, 2013; Huang, 2017).

Previous studies offered policy explanations for migrant students' underachievement. Li (2018) indicated that central governments have less educational funding distributed to provinces containing more migrant population due to fiscal decentralization. On the other hand, the *Hukou* policy [2] has a history of limiting policy supports for internal migrants including subsidies, fee standards, and other financial accesses, which contributes migrant students' underperformance in school (Lu, 2023).

However, both perspectives have failed to identify an integrated framework: if we can discover the impact of differentiated financial supports and per student funding appropriated to two groups of students, then it is plausible to assume that fiscal decentralization is producing local-migrant educational inequity through the lens of *Hukou* status.

In this study, I seek to understand **how governments' differentiated provision of education fundings affects the academic performance disparity between migrant students and local students in China** . My hypothesis is **when the government provides migrant**

[1] See in Promoting reunion and avoiding separation - China's migrant children development report 2024.

[2] The *Hukou* Policy is a population management policy that restraints non-local residents from/uplifts the threshold of enjoying the same social, medical, and educational public services as local households do.

students with limited fundings, and less-supportive charging standards and subsidy policies, the academic performance gap between the two groups of students is likely to widen.

Beyond measuring educational disparities created by the complexity of fiscal decentralization and population management system, this research has practical significance for addressing the ongoing migrant problems in China's urban governance and the institution of compulsory education (National Bureau of Statistics of China et al., 2023). Last but not least, this study can also offer indications for how educational finance and policies provided by government interacts with structural inequality in other social contexts (e.g., areas with higher poverty level or racial disparities, see in studies by Baird (2008) and Hyman (2017)).

Literature Review

In this study, we define *provision of education fundings* as a combination of three elements: (1) the amount of funding, including per-student funding, subsidies, and charging standards; (2) the proportion of funding, which is seperated into central/provincial and county/district level; and (3) the indicator of differentiation, which is whether migrant students enjoy the equal educational financial resources as locally-registered students in terms of funding, subsidies, and charging standards. Inspired by Knoeppel and Della Sala (2015), we consider that education funding, influenced by fiscal decentralization and *Hukou* system, affects migrant and local students in the same schools through context for schooling, which results in unequal academic performances between two student groups.

Education Funding and Academic Achievement

Scholarship in education funding suggests that students of color have been continuously underfunded by federal and state, and the discrepancy between their and higher-SES/white counterparts' academic performance persists (Darling-Hammond, 2004; Gaddis & Lauen, 2014; Lafortune et al., 2018; Ryan, 1999). In China, researchers found similar patterns and disparities among migrant students and local-*Hukou* students. Evidence from China Education Paney survey indicates that local students outperform migrant students at higher quantile point, and increasing total education expenditure is likely shrink the academic achievement gap (Fang & Zhang, 2024).

However, the association between other aspects of education expenditure (e.g. per student funding, central and local government appropriation ratio) and local-migrant academic outcome equity requires further exploration, as most studies center on how funding expands spatial education inequity rather than disparities between different *Hukou* statuses in cities (Wei et al., 2022).

Fiscal Decentralization and Descriminatory Policies against Internal Migrants

Beyond education finance disparities, education policies also differ for migrant and local students in many provinces, which means students without local registration (*hukou*) may have no government subsidies or face different charging standards. Researchers refer this phenomenon as deflecting internal migrants' demands and using education to control urban population influx (Chan & O'Brien, 2019; Friedman, 2018). The disadvantage encountered by migran students varies in different city scenarios: if local education policy background is more *Hukou*-based discriminatory, then migrant students are more likely to receive lower school performance than local students (Ma, 2020). Deflecting education resources away from the underprivileged students occurs in U.S. schools to avoid losing fundings under school accountability, as the minority subgroups have a higher possibility to fall short of the average academic target (Hanushek & Raymond, 2005; O'Day, 2009). Similarly, turning down education fundings for migrant students is also a strategy for Chinese local governments to decrease overall financial stress due to fiscal decentralization (Jin et al., 2005; Long et al., 2017).

As migrant students represent social minorities with limited or without *Hukou*-related rights in urban spaces, exploring their education achievements influenced by government funding and financial supports can demonstrate the dynamic and diverse efficiency of providing public services, offering empirical evidence for the development of decentralization theory (Oates, 2005, 2008).

Data and Methods

Data

In this project, we use the follow-up (2014-2015) dataset from the China Education Panel Survey CEPS. CEPS is conducted by National Survey Research Center at Renmin University of

China and it is the most used dataset in studies of Chinese internal migrant students. Data includes 1769 migrant students and 7960 non-migrant students who have were at 9th Grade as in the final year of Junior High. We will merge datasets based on student, class, and school id, and remove values without valid information of hukou status.

Measures

The dependent variable in our study is the academic performance, which is measured by three indexes: score (percentage) of Chinese, Mathematics, and English exams. Table 1 shows the mean, standardized deviation and number of per-student funding categorized by student groups.

Table 1

Summary Results of per-student funding

Migrant status	MPG (mean)	MPG (sd)	N
1	1,044.41	675.19	7,960
2	1,280.29	792.98	1,769

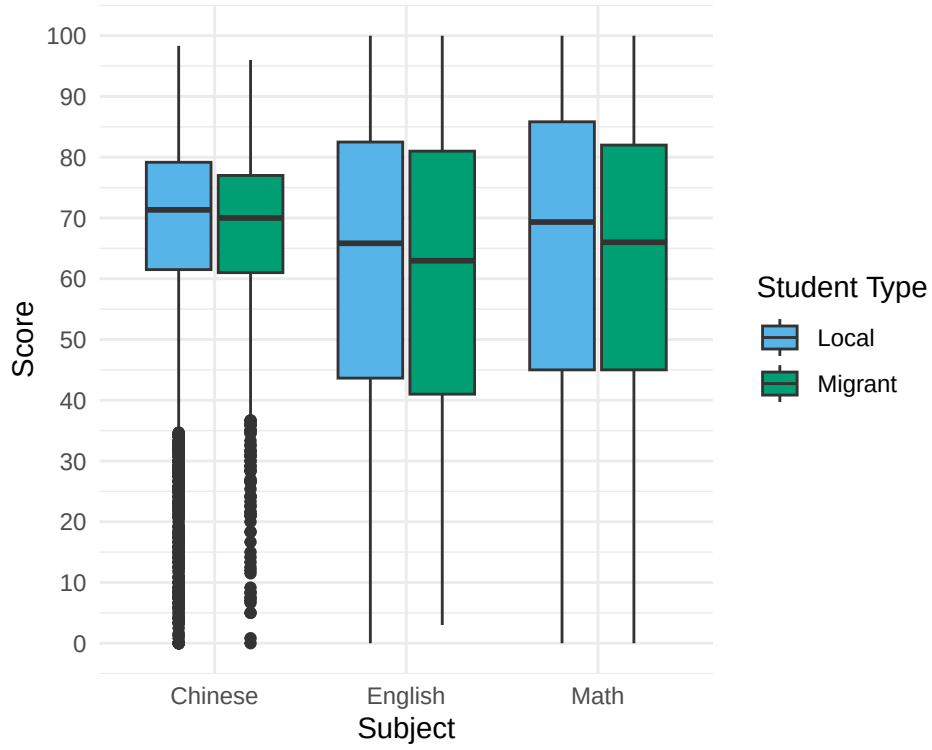
Note. Mean, standardized deviation and number of per_st_funding

In Figure 1, a primary investigation into the follow-up dataset suggests that the medium and average of all three test scores for migrant students are all less than the equivalents for non-migrant students. Migrant students performances in Chinese and English exams are more concentrated than local students, but possibly due to different sample size. More outliers in Chinese exam scores appeared in migrant student group than their local counterparts, suggesting migrant students might experience greater difficulty in achieveing in Chinese exams. Additionally, the average Chinese, Mathematics and English exam scores of migrant students are respectively 67.6533095, 62.026304, and 60.5801271, which are lower than their local counterparts' academic achievements (68.6661009, 63.9595634, and 61.9371545).

As for the independent variable, we take three aspects into account: the amount of

Figure 1

Comparison of the distribution of Chinese, Mathematics, and English exam scores (Migrant vs. Local students)



per-student funding; the proportion of funding sources, which is seperated into central/provincial level and county/district level; and whether migrant students enjoy the equal funding, subsidies, and charging standards as locally-registered students do.

Table 2

	Statistic (t)	df	P-value	Mean (Local students)	Mean (Migrant students)
t	-11.6108	2369.945	0	1044.407	1280.291

In Table 2, we examined the difference of mean per-student funding for local and migrant students. The results indicate that the average per-student funding is significantly different in two student subgroups, with a p-value of 0. It is worth noticing that the mean funding for each migrant student (1280.29051) is higher than the local student's (1044.4065621), which aligns with

the policy guidance from central government in China. The result is also counterintuitive with the reverse comparison of academic achievements in Figure 1. These findings call for further investigation in the the effect of educational funding provision on academic achievement inequality.

Methods

We employ a **Multilevel Model (MLM)** to see the effect of independent variables on the academic performance gap between migrant students and local students. Since migrant students and local students are clustered in different schools, MLM can provide a hierarchical model fitness that can take cluster effect into account (Antonoplis, 2023). We will implement random intercept, fixed slope model to examine the research question primarily. When analyzing data in later procedures, MLM can be adjusted with improvement in significance tests and improvement in fit. The two-level model can be put in an incorporated formula:

$$examscore_{ij} = \beta_0 + \beta_1 \cdot mig\_status + \beta_2 \cdot centgov\_fund\_pct_j + \beta_3 \cdot prefgov\_fund\_pct_j$$

$$+\beta_4 \cdot countgov\_fund\_pct_j + \beta_5 \cdot per\_st\_funding_j + \beta_6 \cdot mig\_funding_j + \beta_7 \cdot same\_charge\_std_j$$

$$+\beta_8 \cdot mig\_subsidy_j + \beta_9 \cdot (mig\_status_{ij} \times centgov\_fund\_pct_j)$$

$$+\beta_{10} \cdot (mig\_status_{ij} \times prefgov\_fund\_pct_j) + \beta_{11} \cdot (mig\_status_{ij} \times countgov\_fund\_pct_j)$$

$$+\beta_{12} \cdot (mig\_status_{ij} \times per\_st\_funding_j) + \beta_{13} \cdot (mig\_status_{ij} \times mig\_funding_j)$$

$$+\beta_{14} \cdot (mig\_status_{ij} \times same\_charge\_std_j) + \beta_{15} \cdot (mig\_status_{ij} \times mig\_subsidy_j) + u_j + \epsilon_{ij}$$

In this funtion, we denote i as the individual student and j as the school. The estimate for the fixed effect are as follows: (1) β_0 is the overall intercept; (2) β_1 stands for the effect of being a migrant student; (3) β_2 to β_8 extimate the effects of independent variables; (4) β_9 to β_15 extimate the interaction effects of independent variables and migrant status; (5) u_j is the random intercept for school j; and (6) ϵ_{ij} represents the residual error.

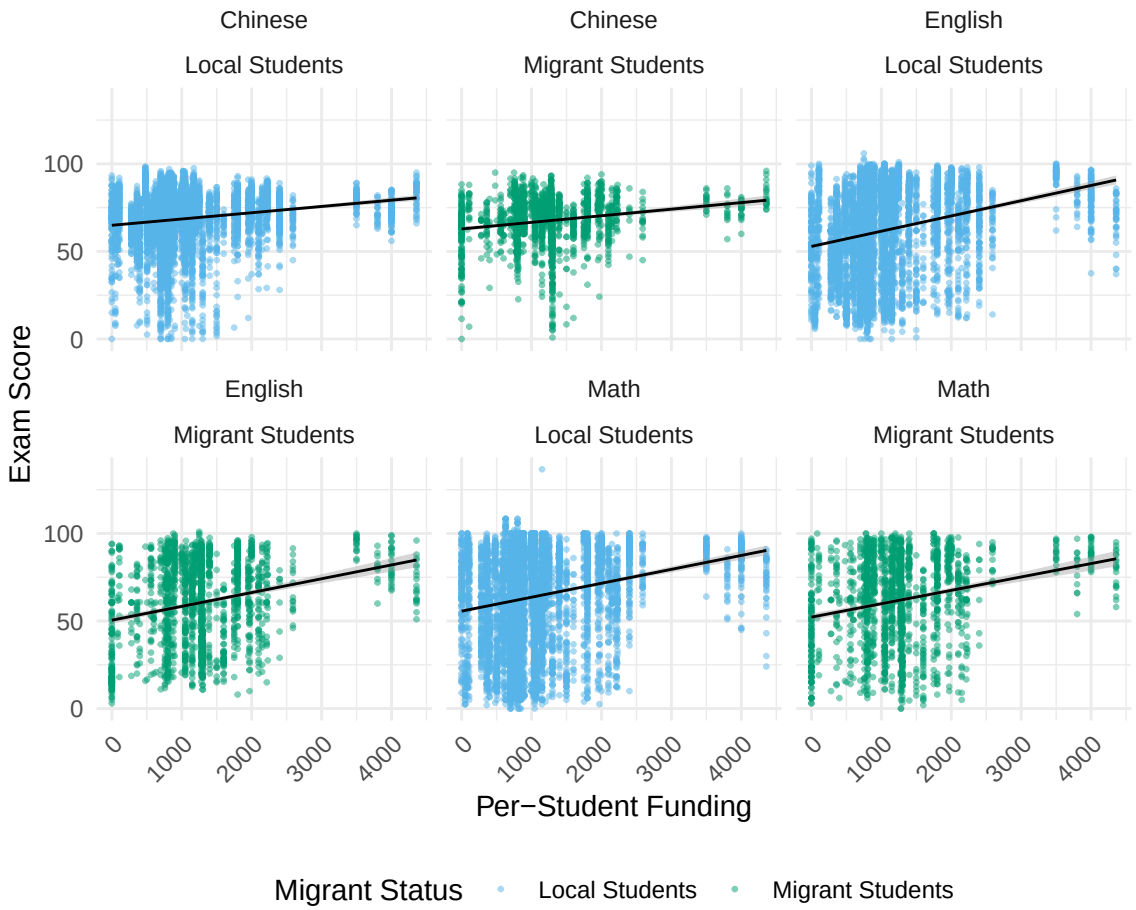
Analysis Results

Linear Relation between Per-student Funding and Academic Achievements

We first investigated the correlation between per-student funding and exam scores. Figure 2 shows that the linear relation between per-student funding and academic achievements is positive across student groups and subjects. The estimate for the relation of Chinese exam score with per-student funding is relatively smaller than the other two subjects. However, we cannot observe a significant difference in this relation between local student and migrant student groups.

Figure 2

The linear relation between per-student funding and exam scores across two student groups



The Effect of Education Funding on Academic Achievments in Different Student Groups

In this section, we employed the MLM method to estimate the effect of educational funding on the exam scores in three subjects. In the results, the estimate of the migrant status variable `mig_status` represents β_1, which is the effect of being a migrant student on the overall academic performance. The rest of the estimates are for the independent variables or interaction terms.

Table 3 computes the regression outcome of the funding effect on Chinese exam scores, with cluster effect of schools. The estimate for migrant status is 3.806, indicating a significant postive impact on the academic performance in Chinese exam with a p-value of 0.035. This finding refutes our previous hypothesis that being a migrant student can negatively influence one's academic performance. Within the same school, migrant students averagely outperform local students in Chinese exam by 3.806 with significance. The results in the table also suggest that one-unit higher per-student funding can increase the individual's Chinese exam score by 0.003. The rest of the independent variables including proportion of funding resources and whether migrant students enjoy the equal level of educational finance resources has no significant impact on the academic performance in Chinese exam. However, when the school does not enroll migrant students, and the context of whether migrant students and local students share the same charging standard and subsidies is missing, migrant students tend to suffer from a significant negative impact and a lower Chinese exam score than local students.

Table 4 computes the regression outcome of the funding effect on Math exam scores, with cluster effect of schools. The estimate for migrant status is not significant, but still has a postive impact on the academic performance in Math exam with a p-value of 0.791. One-unit higher per-student funding can increase the individual's Math exam score by 0.007, with a significance of 0. We can also see that the an increase in the proportion of education fiscal appropriation from Prefecture level has a significant negative impact on individual's Math exam score. Similar with what we found in the funding effect on Chinese exam performance, the rest of the independent variables has no significant impact on the academic performance in Math exam. And when the

school does not enroll migrant students, and the context of whether migrant students and local students share the same charging standard and subsidies is missing, migrant students tend to suffer from a significant negative impact and a lower Math exam score than local students. It is significant that when the quota of fiscal allocation for migrant students is less than that of the local students, the Math exam score of migrant students will drastically decrease by -15.439, with a p-value of 0.08.

Lastly, Table 5 computes the regression outcome of the funding effect on English exam scores, with cluster effect of schools. The estimate for migrant status is not significant. And the finding of per-student funding effect on individual's English exam score is identical with our previous discoveries in Table 3 and Table 4. Most independent variables has no significant impact on the academic performance in English exam. When the information of whether migrant students enjoy the equal level of subsidies with local students is missing, individual student may increase their English exam score by a 13.336, with a significance of 0.045 And when the school does not enroll migrant students, and the information of whether migrant students and local students share the same subsidies is missing, migrant students tend to suffer from a significant negative impact and a lower English exam score than local students (with corresponding estimates of -3.902 and -7.679.

Conclusion

This study examines the impact of differentiated educational funding on the academic performance disparity between migrant and local students in China, within the broader social context of fiscal decentralization and the Hukou system. Using a multilevel modeling approach that accounts for school-level clustering, our findings challenge the conventional assumption that migrant status inherently disadvantages students academically. In the Chinese exam, migrant students demonstrate a significant performance advantage over their local counterparts within the same school. However, across all three subjects (Chinese, Math, and English), educational funding allocation plays a crucial role in shaping academic outcomes.

Specifically, higher per-student funding is consistently associated with improved exam

scores, while discrepancies in fiscal allocation, particularly when migrant students receive lower quotas or when key financial information is missing, contribute to their academic disadvantage. The exclusion of migrant students from certain schools further exacerbates disparities, leading to significant negative impacts on their performance. Additionally, a higher proportion of educational funding from the prefecture level is found to negatively affect math achievement, suggesting potential inefficiencies in decentralized funding structures.

These findings highlight the urgent need for policy interventions aimed at ensuring equitable access to educational resources for migrant students. Policymakers should prioritize increasing transparency in fiscal allocations, equalizing per-student funding across student groups, and addressing institutional barriers that restrict migrant students' school enrollment. Addressing these systemic inequalities is essential for fostering a more inclusive and equitable urban education system in China.

Table 3

The effect of education funding on Chinese exam scores differences within schools

Term	Estimate	Std. Error	df	t.value	P.Value
(Intercept)	61.576	3.582	119.001	17.193	0.000
mig_status2	3.806	1.801	9,491.442	2.113	0.035
per_st_funding	0.003	0.001	113.648	2.828	0.006
centgov_fund_pct	-0.017	0.030	137.953	-0.578	0.564
prefgov_fund_pct	-0.036	0.034	165.192	-1.079	0.282
countgov_fund_pct	0.014	0.026	157.789	0.542	0.589
mig_funding2	1.463	9.566	96.829	0.153	0.879
mig_funding3	0.945	3.386	102.311	0.279	0.781
mig_funding4	4.872	2.648	100.764	1.840	0.069
mig_fundingmissing	3.373	3.687	98.670	0.915	0.362
same_charge_std1	3.192	2.578	100.672	1.238	0.219
same_charge_stdmissing	-3.248	4.379	100.761	-0.742	0.460
mig_subsidy1	-1.194	4.799	98.712	-0.249	0.804
mig_subsidymissing	3.268	4.482	101.070	0.729	0.468
mig_status2:per_st_funding	0.000	0.001	9,697.198	-0.859	0.390
mig_status2:centgov_fund_pct	-0.018	0.017	8,222.243	-1.080	0.280
mig_status2:prefgov_fund_pct	-0.022	0.015	7,063.107	-1.464	0.143
mig_status2:countgov_fund_pct	-0.001	0.015	4,101.584	-0.059	0.953
mig_status2:mig_funding2	-3.368	4.829	9,650.535	-0.698	0.486
mig_status2:mig_funding3	-0.226	1.428	9,682.045	-0.158	0.874
mig_status2:mig_funding4	-4.285	1.226	9,699.225	-3.494	0.000
mig_status2:mig_fundingmissing	-1.187	1.292	9,632.857	-0.919	0.358
mig_status2:same_charge_std1	-1.469	1.177	9,679.108	-1.248	0.212
mig_status2:same_charge_stdmissing	3.088	1.735	9,702.955	1.780	0.075
mig_status2:mig_subsidy1	-0.590	2.302	9,689.675	-0.256	0.798
mig_status2:mig_subsidymissing	-3.839	2.172	9,546.821	-1.767	0.077

Table 4

The effect of education funding on Mathematics exam scores differences within schools

Term	Estimate	Std. Error	df	t.value	P.Value
(Intercept)	53.626	5.159	115.555	10.394	0.000
mig_status2	0.865	3.269	9,466.250	0.265	0.791
per_st_funding	0.007	0.002	112.174	4.280	0.000
centgov_fund_pct	-0.029	0.044	123.893	-0.671	0.504
prefgov_fund_pct	-0.090	0.050	142.108	-1.803	0.074
countgov_fund_pct	-0.014	0.039	135.688	-0.357	0.722
mig_funding2	13.397	13.458	96.793	0.995	0.322
mig_funding3	3.670	4.805	104.988	0.764	0.447
mig_funding4	4.472	3.745	101.323	1.194	0.235
mig_fundingmissing	6.086	5.203	99.880	1.170	0.245
same_charge_std1	4.709	3.650	102.782	1.290	0.200
same_charge_stdmissing	-1.444	6.199	102.857	-0.233	0.816
mig_subsidy1	-4.189	6.774	100.061	-0.618	0.538
mig_subsidymissing	5.546	6.351	103.917	0.873	0.385
mig_status2:per_st_funding	0.001	0.001	9,701.457	1.054	0.292
mig_status2:centgov_fund_pct	-0.006	0.030	8,670.598	-0.213	0.831
mig_status2:prefgov_fund_pct	-0.016	0.027	7,798.592	-0.589	0.556
mig_status2:countgov_fund_pct	-0.005	0.026	5,005.892	-0.207	0.836
mig_status2:mig_funding2	-15.439	8.816	9,646.822	-1.751	0.080
mig_status2:mig_funding3	-2.507	2.597	9,572.566	-0.966	0.334
mig_status2:mig_funding4	-3.857	2.234	9,697.296	-1.726	0.084
mig_status2:mig_fundingmissing	-0.627	2.349	9,669.096	-0.267	0.790
mig_status2:same_charge_std1	0.057	2.141	9,663.886	0.027	0.979
mig_status2:same_charge_stdmissing	7.233	3.160	9,702.243	2.288	0.022
mig_status2:mig_subsidy1	0.523	4.186	9,575.585	0.125	0.901
mig_status2:mig_subsidymissing	-8.362	3.944	9,511.590	-2.120	0.034

Table 5

The effect of education funding on English exam scores differences within schools

Term	Estimate	Std. Error	df	t.value	P.Value
(Intercept)	47.440	5.287	118.517	8.973	0.000
mig_status2	1.523	2.919	9,490.931	0.522	0.602
per_st_funding	0.008	0.002	113.803	4.466	0.000
centgov_fund_pct	-0.045	0.045	132.647	-1.010	0.314
prefgov_fund_pct	-0.037	0.050	155.902	-0.726	0.469
countgov_fund_pct	0.021	0.040	148.610	0.521	0.603
mig_funding2	-1.239	13.981	97.859	-0.089	0.930
mig_funding3	5.468	4.965	104.331	1.101	0.273
mig_funding4	3.586	3.878	102.025	0.925	0.357
mig_fundingmissing	5.143	5.394	100.155	0.953	0.343
same_charge_std1	6.135	3.776	102.494	1.625	0.107
same_charge_stdmissing	0.696	6.414	102.567	0.108	0.914
mig_subsidy1	0.289	7.022	100.258	0.041	0.967
mig_subsidymissing	13.336	6.567	103.177	2.031	0.045
mig_status2:per_st_funding	0.000	0.001	9,701.670	0.165	0.869
mig_status2:centgov_fund_pct	-0.028	0.027	8,415.033	-1.059	0.289
mig_status2:prefgov_fund_pct	-0.028	0.025	7,407.079	-1.143	0.253
mig_status2:countgov_fund_pct	0.000	0.023	4,443.649	-0.002	0.999
mig_status2:mig_funding2	-5.058	7.844	9,649.350	-0.645	0.519
mig_status2:mig_funding3	-2.131	2.316	9,655.448	-0.920	0.358
mig_status2:mig_funding4	-3.902	1.991	9,702.788	-1.961	0.050
mig_status2:mig_fundingmissing	0.197	2.095	9,652.163	0.094	0.925
mig_status2:same_charge_std1	-0.842	1.909	9,676.482	-0.441	0.659
mig_status2:same_charge_stdmissing	3.193	2.815	9,702.920	1.134	0.257
mig_status2:mig_subsidy1	-3.508	3.734	9,664.035	-0.940	0.347
mig_status2:mig_subsidymissing	-7.679	3.521	9,542.046	-2.181	0.029

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