

The Effects of Student Loan Access on Educational Attainment for Marginal Students

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Disclaimer

- The results in this report are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand.
- The opinions, findings, recommendations, and conclusions expressed in this report are those of the authors, not Statistics NZ.
- Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this report have been confidentialised to protect these groups from identification.
- Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

Disclaimer

- The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes.
- Any person who has had access to the unit record data has certified that they have been shown, have read, and have understood section 81 of the Tax Administration Act 1994, which relates to secrecy. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

Introduction

- The accumulation of huge student loan debts has attracted significant public attention worldwide
 - US\$1.4 trillion in the U.S. \approx \$30,000 per student
 - NZ\$15 billion (11 billion USD) in NZ \approx \$21,000 (15,000 USD) per student
 - \$180 billion (6 billion USD) in TW \approx \$220,000 (7,000 USD) per student
- Economic theory suggests that access to student loans can ease credit constraints and help human capital investment
- However, academically weak students may acquire a large amount of debt without obtaining a degree and the ability to repay

Introduction

- As marginal students are more likely from low socioeconomic backgrounds, instead of reducing disparities between the rich and poor, easy access to student loans may widen existing socioeconomic inequality
- One challenge for evaluating causal effects of student loans on human capital accumulation is to control for student heterogeneity
 - How credit constrained a student is depends on family income and assets
 - Simultaneity bias: students choose loan and going to university simultaneously
 - Eligibility for student loans/aids often depends on academic performance

Introduction

- We estimate the causal effects of the New Zealand Student Loan Scheme on university persistence, completion, and labour market returns
- We implement a fuzzy regression discontinuity design (RDD) based on a performance rule that requires students to pass at least 50% of credits after two-year study to maintain loan eligibility
- We use the Integrated Data Infrastructure (IDI), the administrative datasets that cover everyone in New Zealand
 - The IDI links individuals' education, student loan, income and tax records, health insurance, and etc.

Finding Preview

- Students just below the cutoff are around 10 percentage points less likely to have a loan in the next year
- Students just below the cutoff are 5-6 percentage points less likely to re-enrol university in the next year and around 5 percentage points less likely to complete a BA degree
- The effect of loan access on university continuation is around 70 percentage points (p.p.) and the effect on university completion is around 50 percentage points (p.p.)
 - These are 90-100% decrease in persistence and completion rates

Literature

- Empirical evidence suggests that credit constraints play an important causal role in education
 - Stinebrickner and Stinebrickner (2008) find that credit constraints directly influence university students' drop-out decisions
 - Barr (2016) finds that a financial aid program decreases the probability that would-be students will enlist in the military
- It is well-established in the literature that financial aid can encourage tertiary education enrolments
 - Student loans are often heavily subsidized by government and a common form of financial aids, e.g., NZ student loan is interest free
 - Carruthers & Fox, 2016; C. Cornwell, David B. Mustard, & Deepa J. Sridhar, 2006; S. Dynarski, 2002; Dynarski & Scott-Clayton, 2013; Susan M Dynarski, 2003; Gurgand, Lorenceau, & Mélonio, 2011; Solis, 2017

Literature

- However, evidence on outcomes beyond *initial* enrolment has been mixed
 - Some studies find that aids reduce dropout and increase student retention and completion rates (Dynarski, 2008; Scott-Clayton, 2011; Singell, 2004)
 - Others find no significant impacts (Angrist, Lang, & Oreopoulos, 2009; C. M. Cornwell, Lee, & Mustard, 2005).
- Student loan can enhance competition among universities and incentivize students to work hard. However, compared to other forms of financial aids, loan could result in underinvestment in education if people are strongly debt averse
 - Debt aversion is common; around 25% of eligible students in NZ do not take loans even though it is interest free

Literature

- Compared to other forms of financial aids, very few research has examined the causal effects of student loans, perhaps due to lack of plausible natural experiments
- Dunlop (2013) finds that access to U.S. federal loans increases the likelihood of transferring to a four-year university degree for community college students, but Wiederspan (2016) does not find similar effects
- Wiederspan (2016) also shows that students who borrow to fund their educations attempt more additional credits than non-borrowers, but they are not more likely to complete these credits

Literature

- The value of student loan access is significant in low-income countries where student loans represent the most prominent form of government aid for university (Gurgand et al., 2011; Solis, 2017)
- Solis (2017) uses a regression discontinuity design and find that loan access in Chile leads to a 100% increase in university enrolment and a 64% increase in years of university study
 - Consistent with student loans removing credit constraints, the loan largely eliminates the enrolment gap between poor and rich students, i.e., the enrolment gap is not due to ability but credit constraint.

NZ Student Loan Scheme

- The Student Loan Scheme is administered by the Ministry of Social Development (MSD) and Inland Revenue Department (IRD)
 - Only citizens and permanent residents living in New Zealand for at least 3 years are eligible
- The student loan is quite generous. It covers tuition fee, course-related course, and living costs. The loan is interest free since 2006 if the borrower stay in NZ
- The repayment is 12% of earnings above the repayment threshold \$19,136 (\$368 per week)

Performance Rule

- Each student loan contract is generally approved for 52 weeks or less, often ends in December (even if it starts in the middle of the year), and students need to reapply every year
- In 2010, the government announced that the loan eligibility in 2011 will depend on students' past performance
- Once a student have studied 1.6 EFTS (Equivalent Full Time Study), which is roughly 2-year of study, she needs to pass at least half of the EFTS in order to receive a loan next year

Performance Rule

- The performance rule applies to all courses ended in 2009 and after (the policy is retroactive)
- The assessment window is five year
- To enforce the rule, the MSD largely relies on students' self-reports of passage rates but uses an algorithm to audit it.
 - Students may intentionally or unintentionally misreport
- The performance requirement could be exempted due to medical reasons

Data

- We use education data, student loan data, and tax data in the IDI from 2009 to 2016
 - Education (from MOE): student by course and degree completion
 - Student loan (from MSD): loan borrowing by year
 - Tax data (from IRD) : loan balance, repayment, income, welfare benefits, etc.
- The IDI uses both probabilistic and deterministic linking methods
 - The linkage rates are generally very high and around 90%
 - The linkage is not perfect though since probabilistic linkage relies on names and dates of birth

Data

- Our main sample consists of students who are:
 - NZ citizens
 - enrolled in a BA or BA with honours degree
 - started tertiary study in 2007-2014 (only courses ended in 2009 are counted)
 - have a student loan in the year (t) they complete 1.6 EFTS or more
 - do not obtain a BA or above degree in the year ($t + 1$) after completing 1.6 EFTS (i.e., do not complete a degree in three years)
 - The sample covers all eight universities and polytechnics that offer BA degrees
 - We exclude permanent residents

Data

- The full sample size is 91,596 (randomly rounded to base 3)
 - The sample size is 19,038 for students with pass rates between 0.3 – 0.7. Around 5,500 are below 0.5 and 13,500 are above 0.5
 - The sample size is 9,102 for pass rates between 0.4 – 0.6. Around 3,300 are below 0.5 and 6,000 are above 0.5
- When estimating the effects on completion, we use students who started in 2007-2011 and the full sample size is 56,082.
- When estimating the effects on labour market outcomes, we use students who started in 2007-2010 and the full sample size is 30,000.
 - We use people who are overseas less than 6 months and not enrolled in tertiary education fulltime

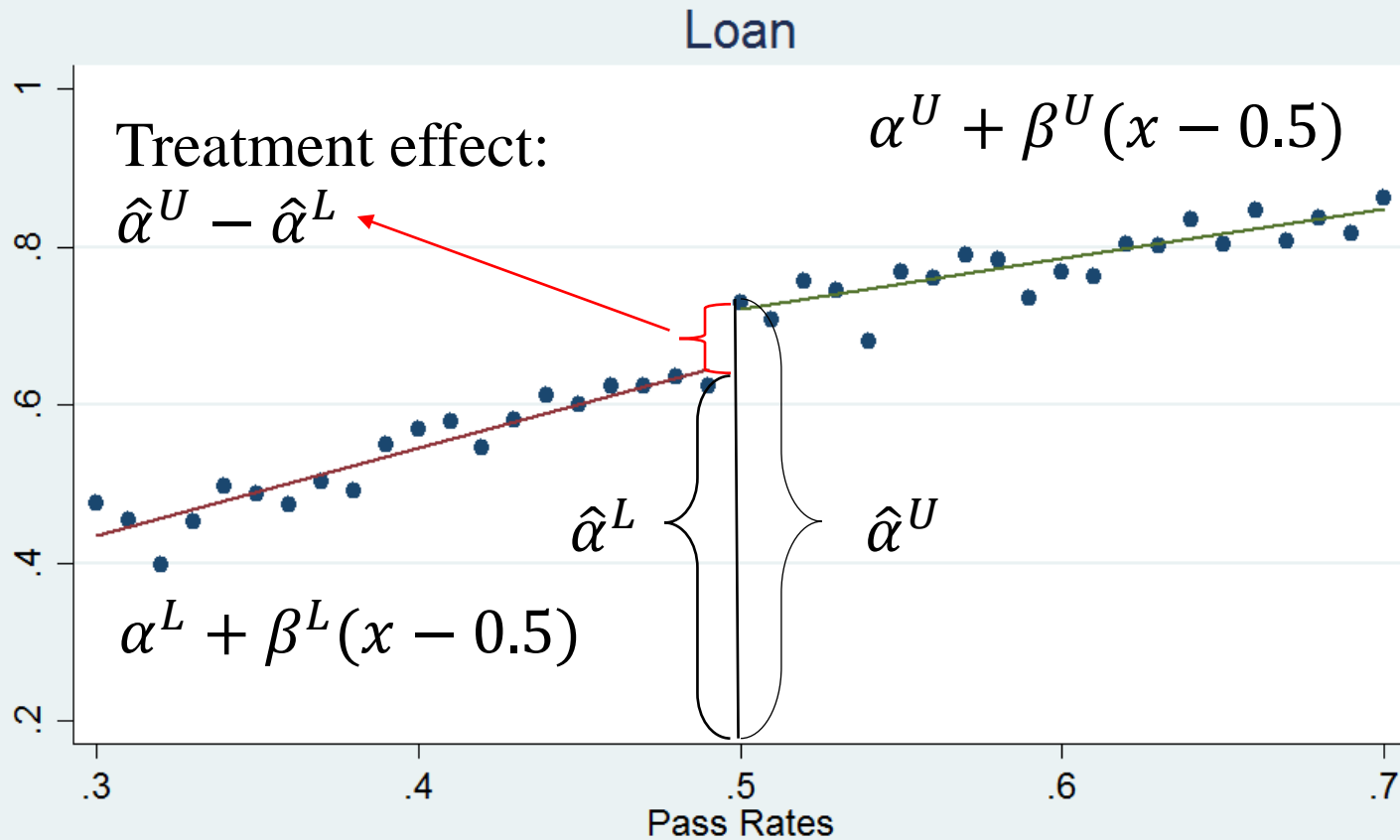
Research Design

- The causal model:

$$Y_i = \alpha + \beta loan_i + X_i\gamma + u_i,$$

- Y_i is education or labour market outcomes such as re-enrolment, degree completion, earnings, and etc. for student i
 - $loan_i$ is a dummy variable indicating whether student i has a loan or not in the year $(t + 1)$ after a student has completed 1.6 EFTS or more (year t)
 - β represents the causal effect of student loan on Y
 - X_i is a vector of demographics and other control variables: age, gender, race, disability status, fulltime status, and high school decile
 - Notice that the data structure is cross-sectional
-
- To estimate the above causal model by fuzzy RDD, we use the 50% cutoff as an instrument variable (IV) for $Loan_i$

Research Design



Model Estimation

- The first stage and reduced form regressions:

$$\begin{aligned} loan_i = & \alpha + \beta^{loan} \cdot \mathbf{1}(pass_i \geq 0.5) + \lambda f(pass_i - 0.5) \\ & + \theta f(pass_i - 0.5) \cdot \mathbf{1}(pass_i \geq 0.5) + X_i \gamma + u_i \end{aligned}$$

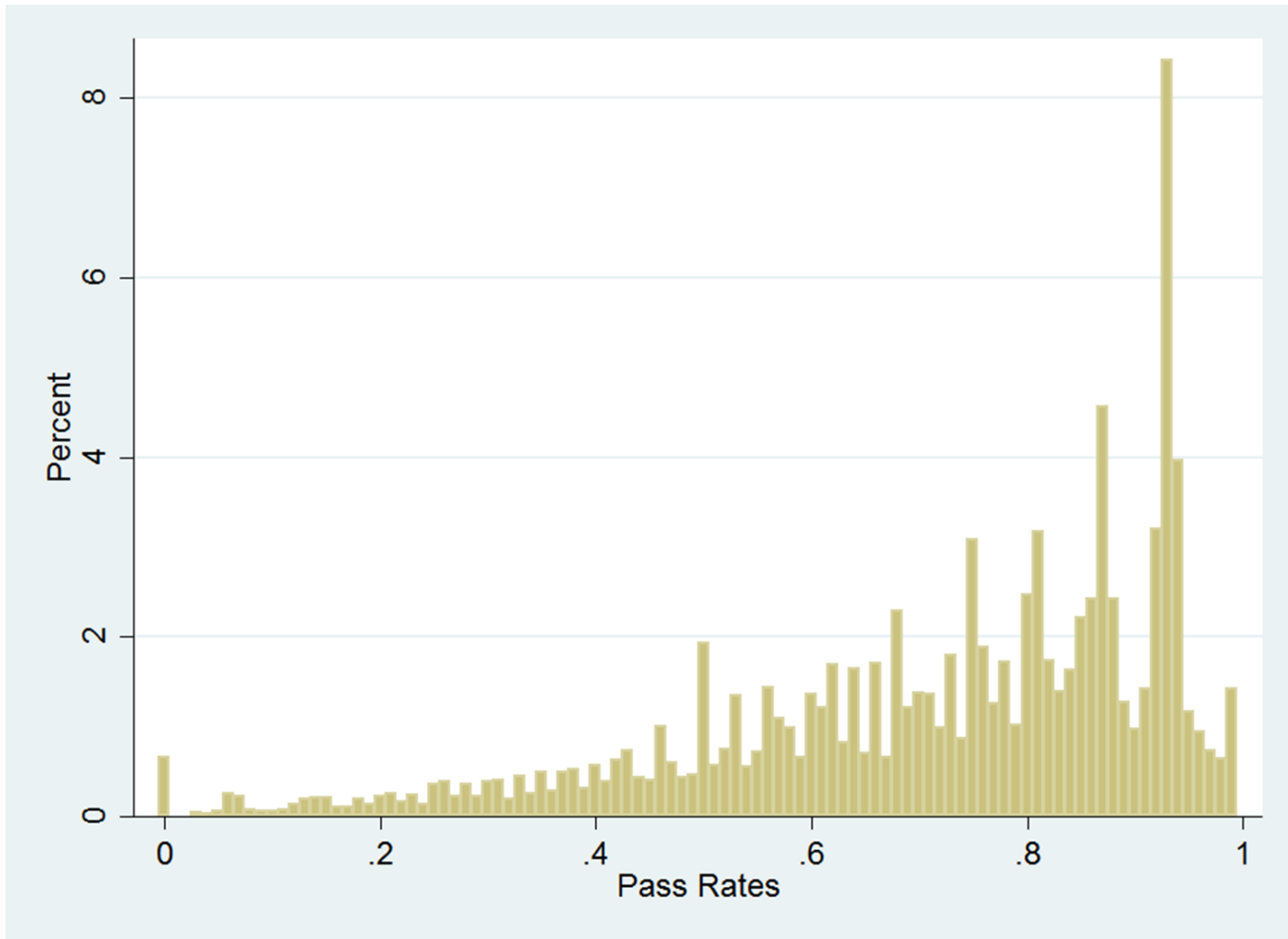
$$\begin{aligned} Y_i = & \alpha + \beta^Y \cdot \mathbf{1}(pass_i \geq 0.5) + \lambda f(pass_i - 0.5) \\ & + \theta f(pass_i - 0.5) \cdot \mathbf{1}(pass_i \geq 0.5) + X_i \gamma + u_i \end{aligned}$$

- $\mathbf{1}(pass_i \geq 0.5)$ is a dummy indicating whether student i 's passage rate, $pass_i$, is equal to or greater than the eligibility threshold
- $f(pass_i - 0.5)$ accounts for the influence of the passage rates on Y_i in a polynomial function $f(\cdot)$
- The causal effect of student loan on Y : $\beta = \beta^Y / \beta^{loan}$

Model Estimation

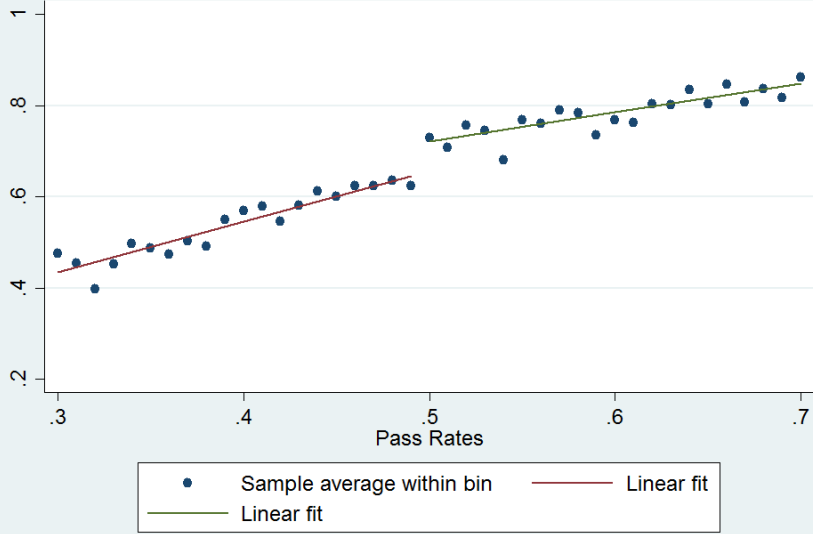
- Gelman and Imbens (2017) argue against using global high-order polynomials in RDD and suggest using local linear or quadratic polynomials with appropriate bandwidths
- First, we use optimal bandwidth and robust inference developed by Calonico, Cattaneo, and Titiunik (2014, 2015) and Calonico, Cattaneo, and Farrel (2016)
 - We use local linear or quadratic regression with triangular kernel
 - Stata command: `rdrobust`
- Second, we use ad hoc bandwidths: pass rates of 0.3 – 0.7 and 0.4 – 0.6 and estimate reduced form effects by OLS
 - It's equivalent to using uniform kernel

Distribution of Pass Rates

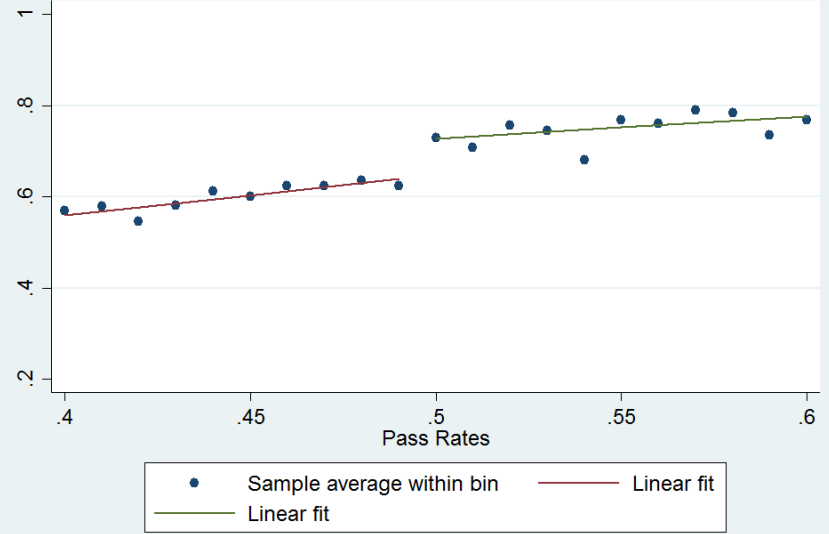


- Roughly 34% of students have a pass rate of 100%

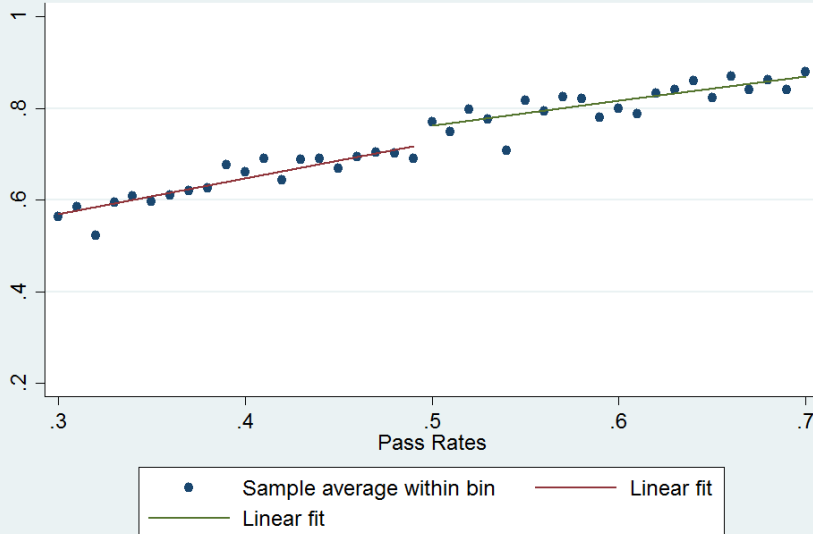
Loan



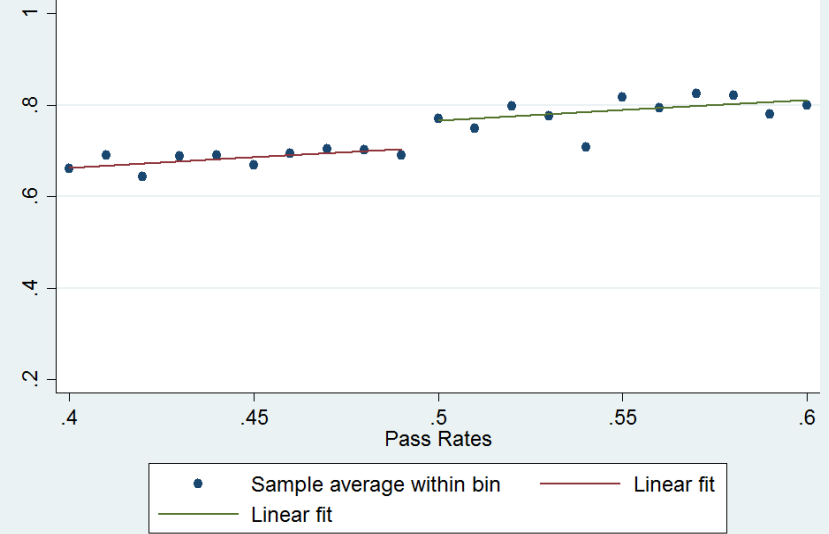
Loan



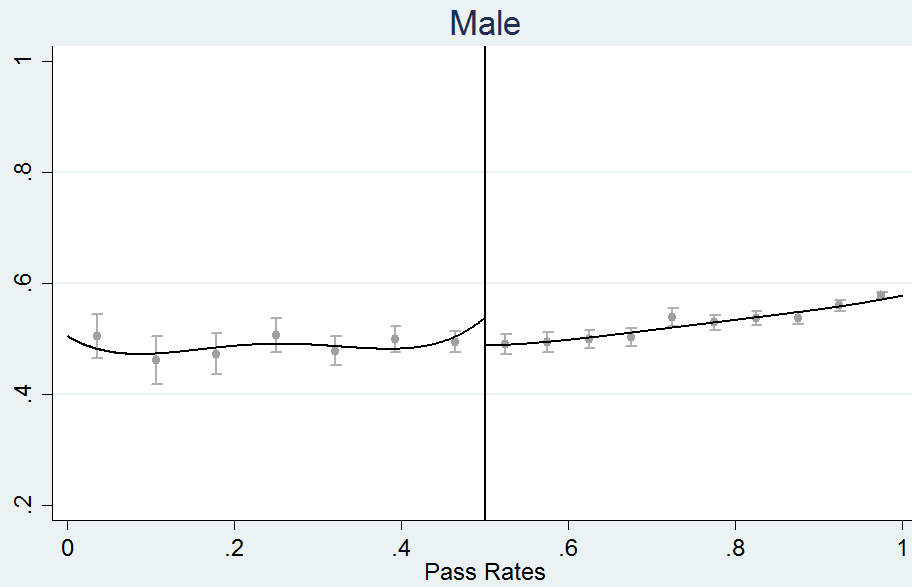
Enrollment



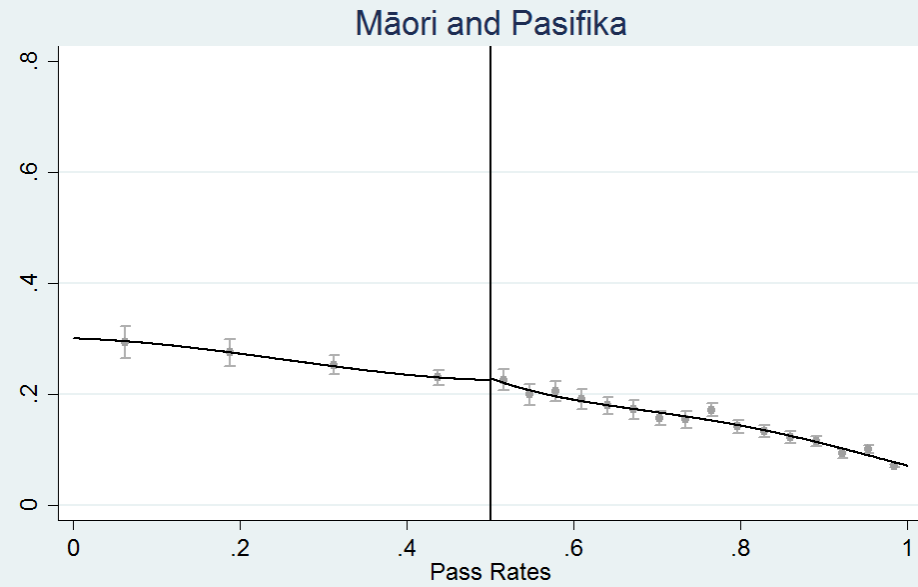
Enrollment



Balanced Test

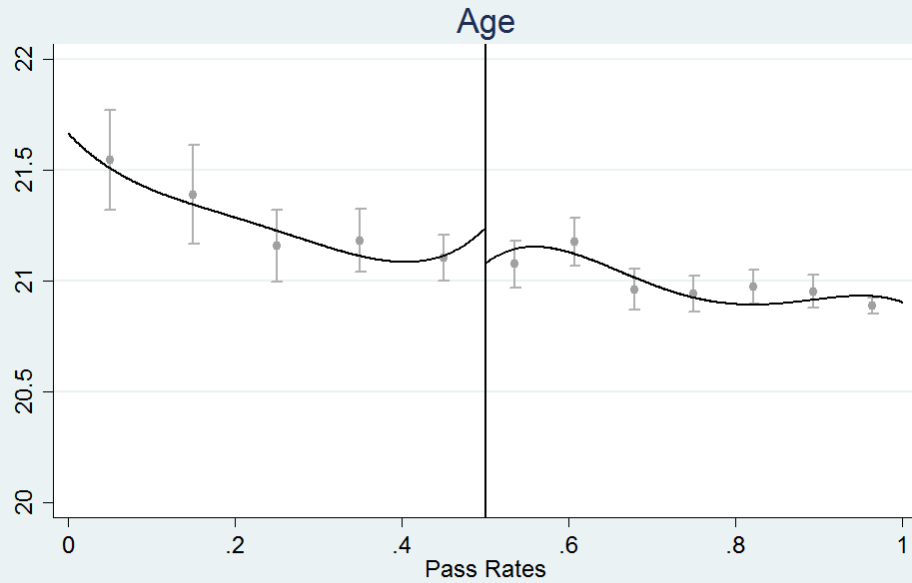


• Sample average within bin — Polynomial fit of order 4

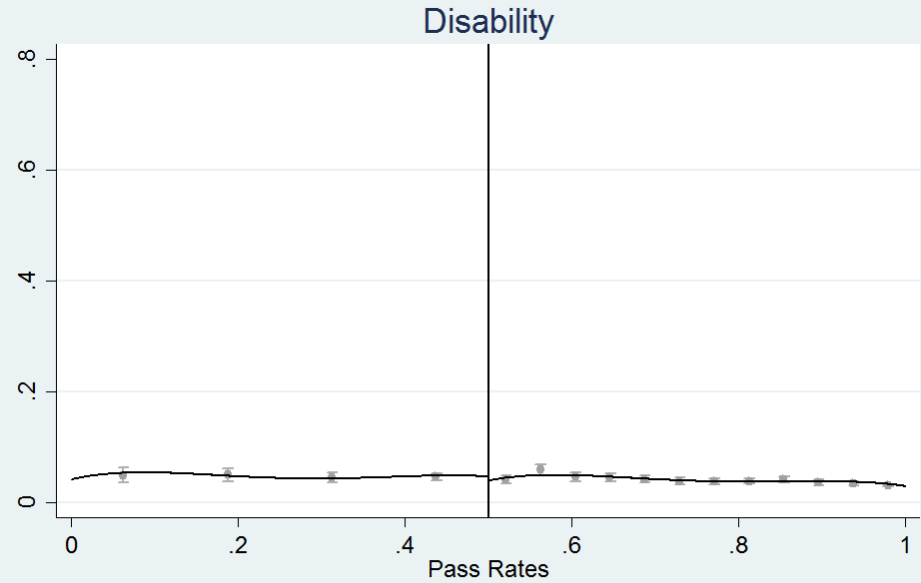


• Sample average within bin — Polynomial fit of order 4

Balanced Test



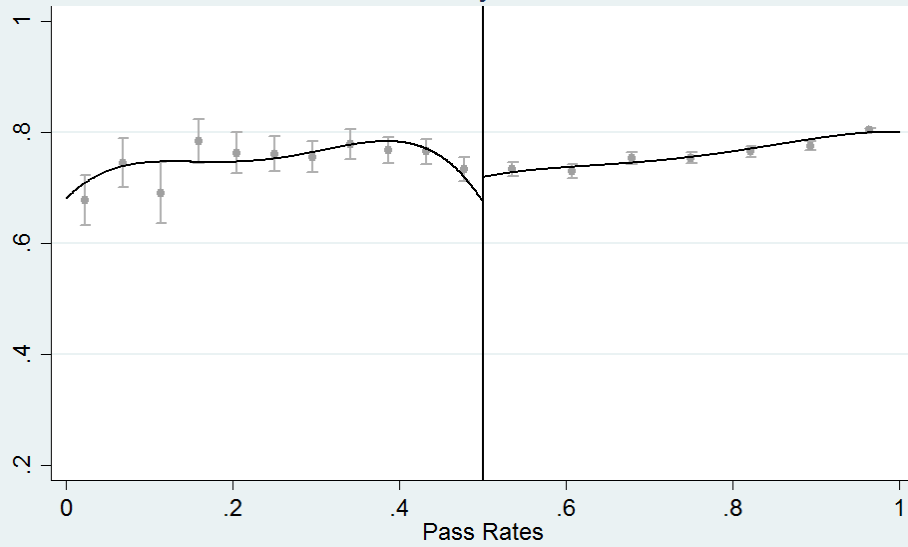
• Sample average within bin — Polynomial fit of order 4



• Sample average within bin — Polynomial fit of order 4

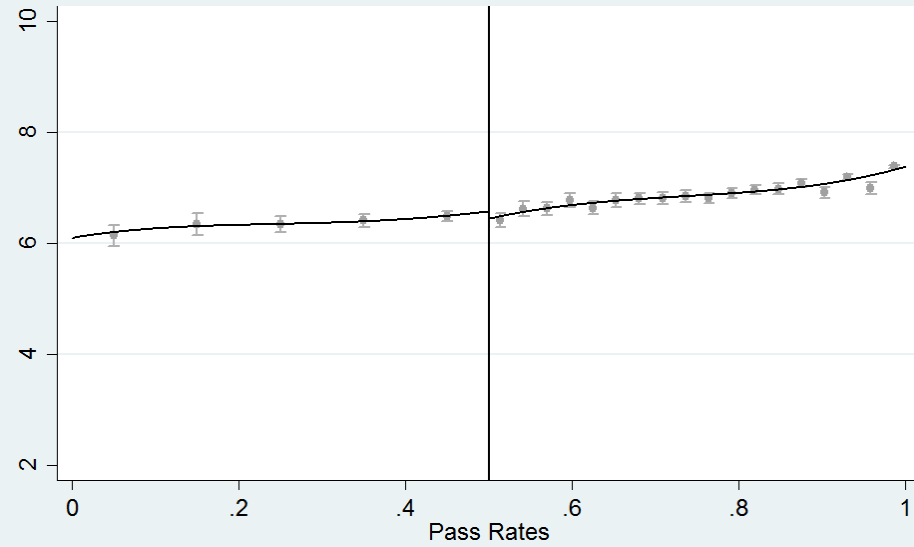
Balanced Test

University Student



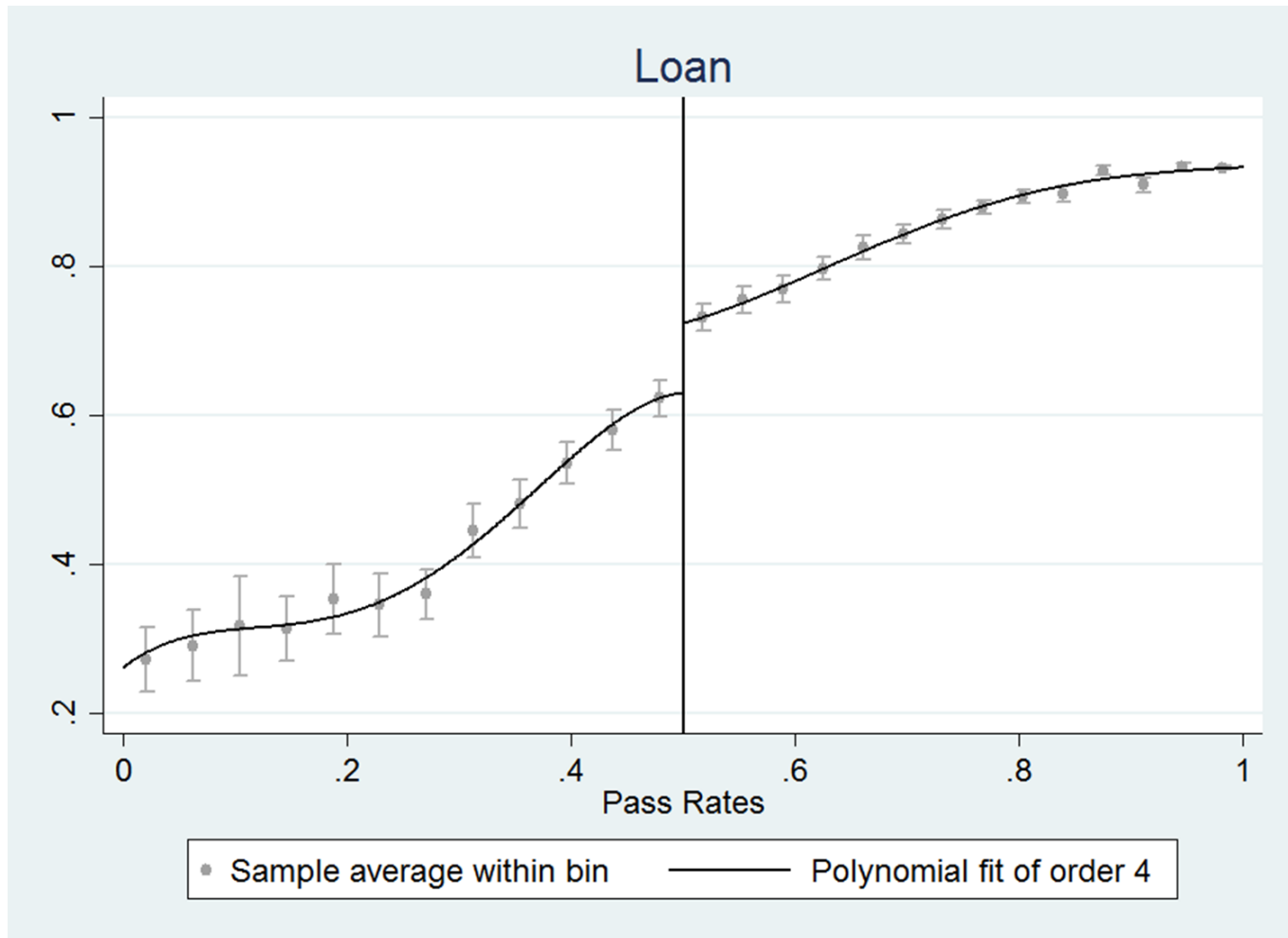
• Sample average within bin — Polynomial fit of order 4

School Decile



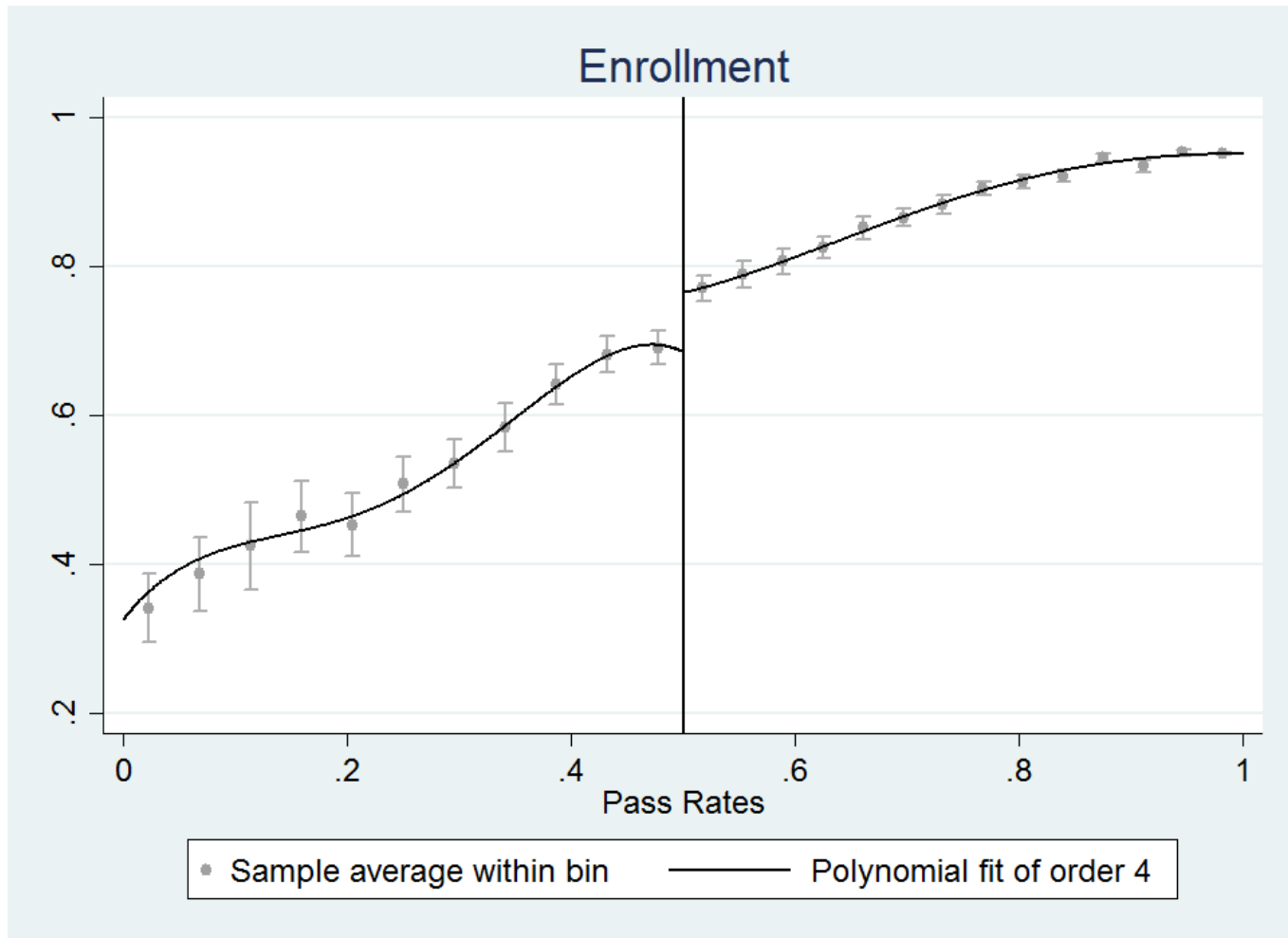
• Sample average within bin — Polynomial fit of order 4

Discontinuity on Loan



Bin sizes: left 0.042; right 0.036 (evenly spaced estimator)

Discontinuity on Enrolment



Bin sizes: left 0.045; right 0.036 (evenly spaced estimator)

Results on Enrolment, Optimal BW

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage		Reduced Form		2 nd Stage	
	Loan		Enrolment		Loan on Enrolment	
Treatment	0.082***	0.079***	0.057***	0.055***	0.709***	0.679***
	(0.019)	(0.019)	(0.017)	(0.017)	(0.112)	(0.106)
Controls	No	Yes	No	Yes	No	Yes
Bandwidth	0.133	0.129	0.158	0.157	0.186	0.218
Obs.						

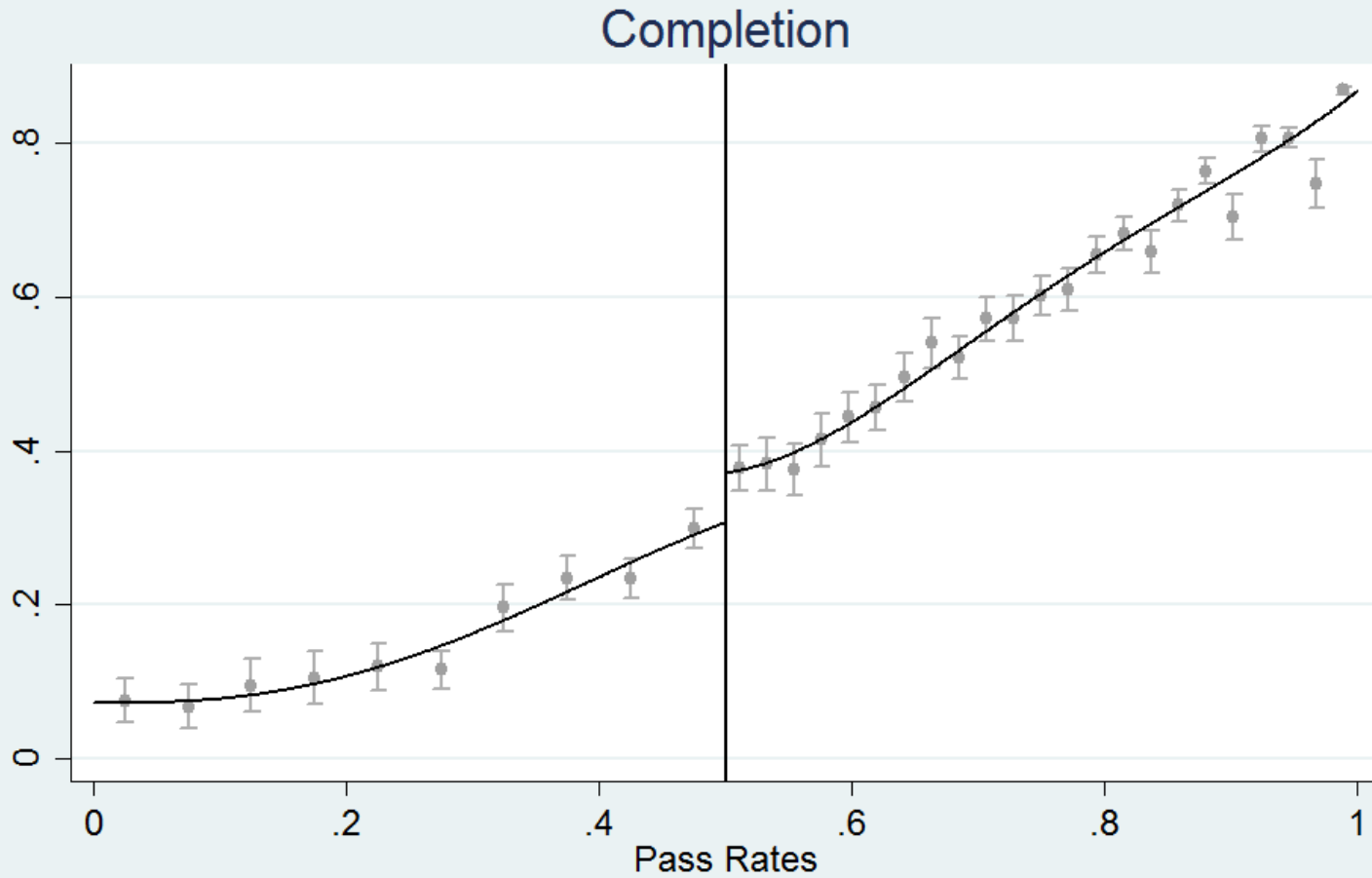
Results on Enrolment, 0.3 – 0.7

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage			Reduced Form		
	Loan			Enrolment		
Treatment	0.071*** (0.013)	0.075*** (0.013)	0.069*** (0.020)	0.043*** (0.013)	0.047*** (0.012)	0.057*** (0.019)
Controls	No	Yes	Yes	No	Yes	Yes
Polynomial	Linear	Linear	Quadratic	Linear	Linear	Quadratic
Bandwidth	0.2	0.2	0.2	0.2	0.2	0.2
Obs.						

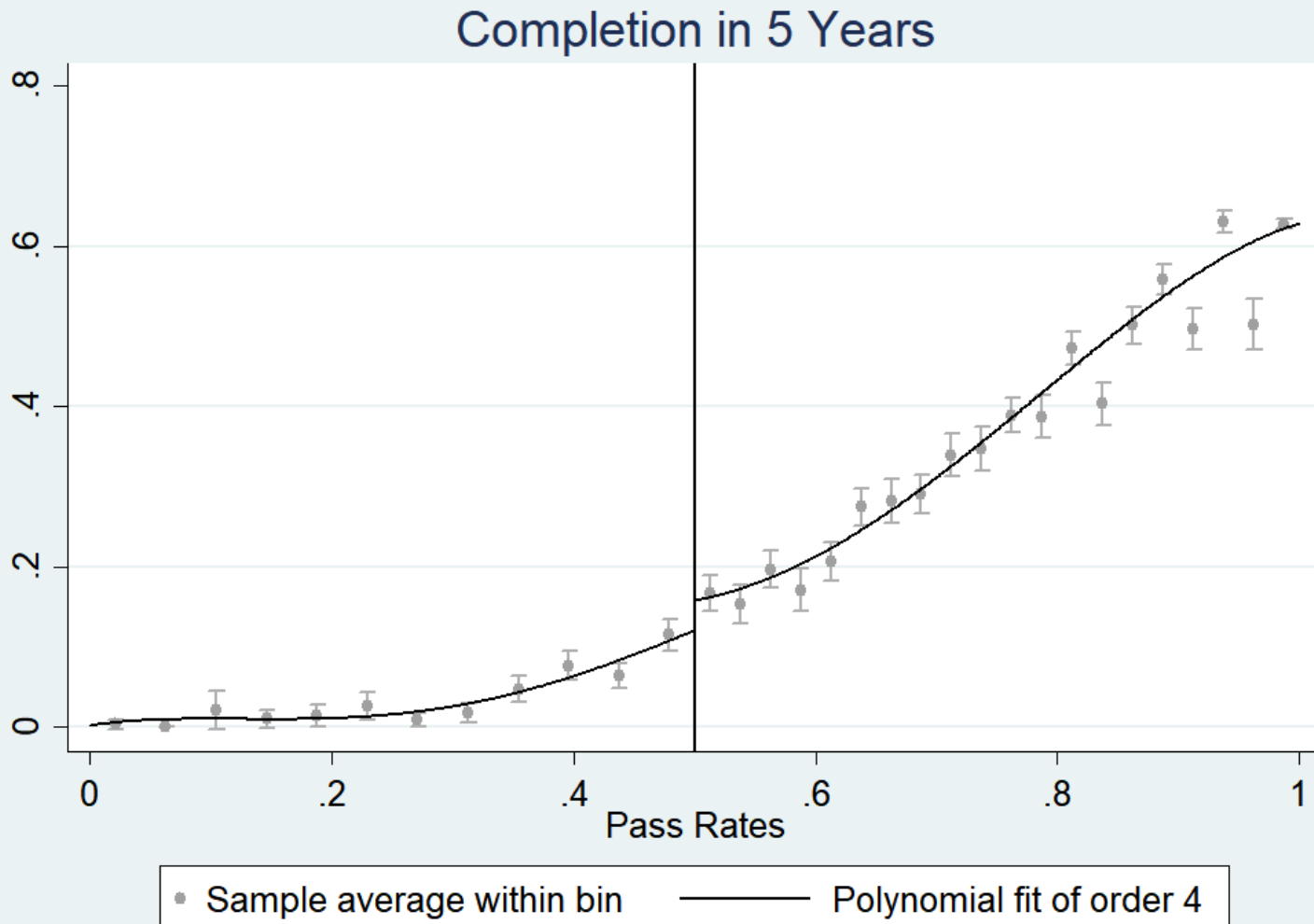
Results on Enrolment, 0.4 – 0.6

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage			Reduced Form		
	Loan			Enrolment		
Treatment	0.086*** (0.019)	0.079*** (0.019)	0.076*** (0.027)	0.061*** (0.018)	0.055*** (0.018)	0.060** (0.026)
Controls	No	Yes	Yes	No	Yes	Yes
Polynomial	Linear	Linear	Quadratic	Linear	Linear	Quadratic
Bandwidth	0.1	0.1	0.1	0.1	0.1	0.1

Discontinuity on BA Completion



Discontinuity on BA 5-yr Completion



Results on Completion, Optimal BW

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage		Reduced Form		2 nd Stage	
	Loan		Completion		Loan on Completion	
Treatment	0.108***	0.097***	0.055**	0.052**	0.517**	0.577**
	(0.027)	(0.026)	(0.023)	(0.022)	(0.235)	(0.234)
Controls	No	Yes	No	Yes	No	Yes
Bandwidth	0.102	0.106	0.133	0.130	0.102	0.144

Results on 5-yr Completion, Optimal BW

	(1)	(2)	(3)	(4)	(5)	(6)
	Reduced Form		Reduced Form		2 nd Stage	
	Enrolment		5-yr Completion		Loan on 5-yr Completion	
Treatment	0.087*** (0.025)	0.077*** (0.025)	0.042*** (0.016)	0.032** (0.015)	0.389** (0.173)	0.353** (0.172)
Controls	No	Yes	No	Yes	No	Yes
Bandwidth	0.102	0.106	0.133	0.130	0.102	0.144

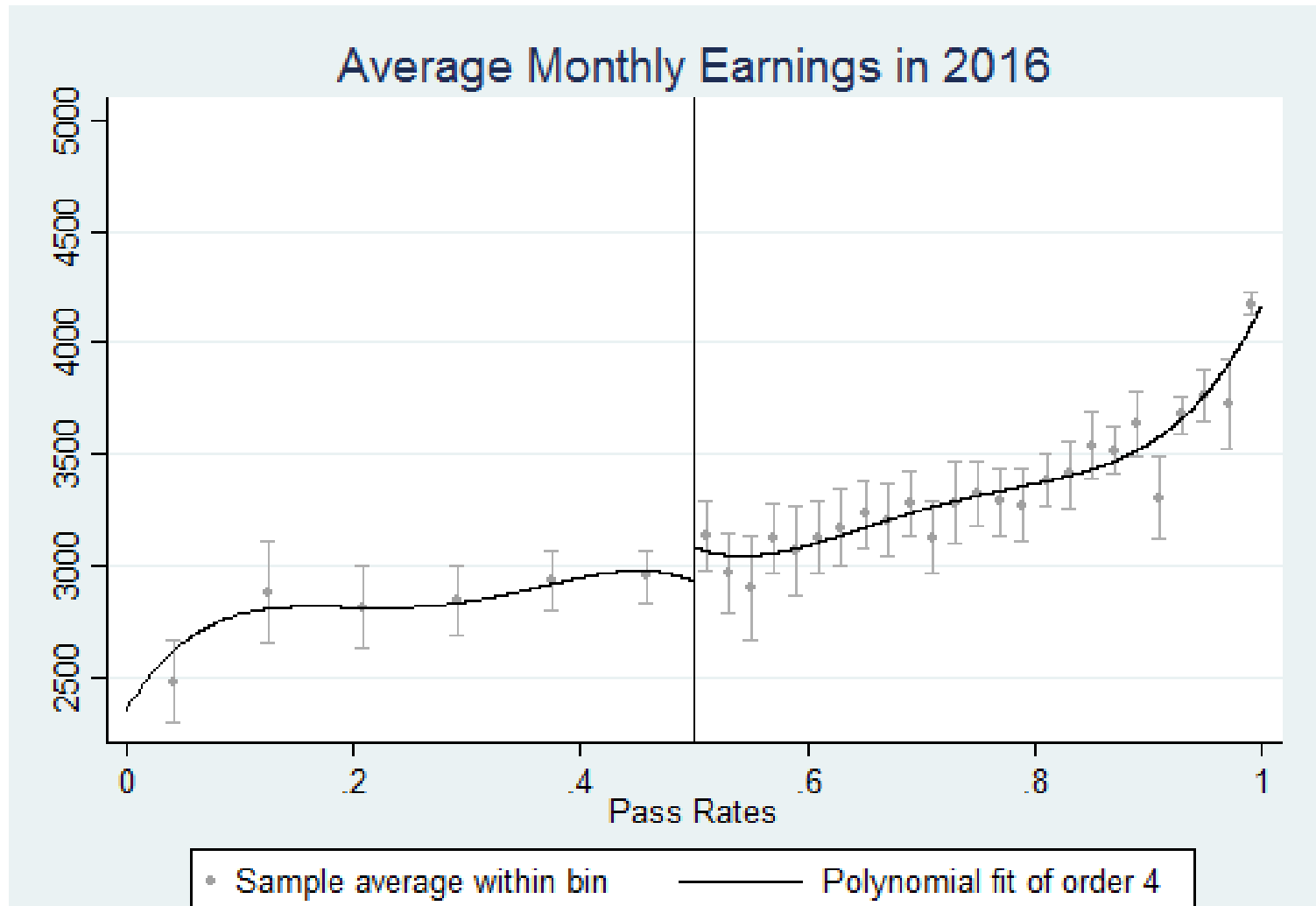
Results on Completion, 0.3 – 0.7 BW

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage			Reduced Form		
	Loan			Completion		
Treatment	0.081***	0.083***	0.087***	0.053***	0.057***	0.047*
	(0.016)	(0.016)	(0.024)	(0.018)	(0.017)	(0.025)
Controls	No	Yes	Yes	No	Yes	Yes
Polynomial	Linear	Linear	Quadratic	Linear	Linear	Quadratic
Bandwidth	0.2	0.2	0.2	0.2	0.2	0.2

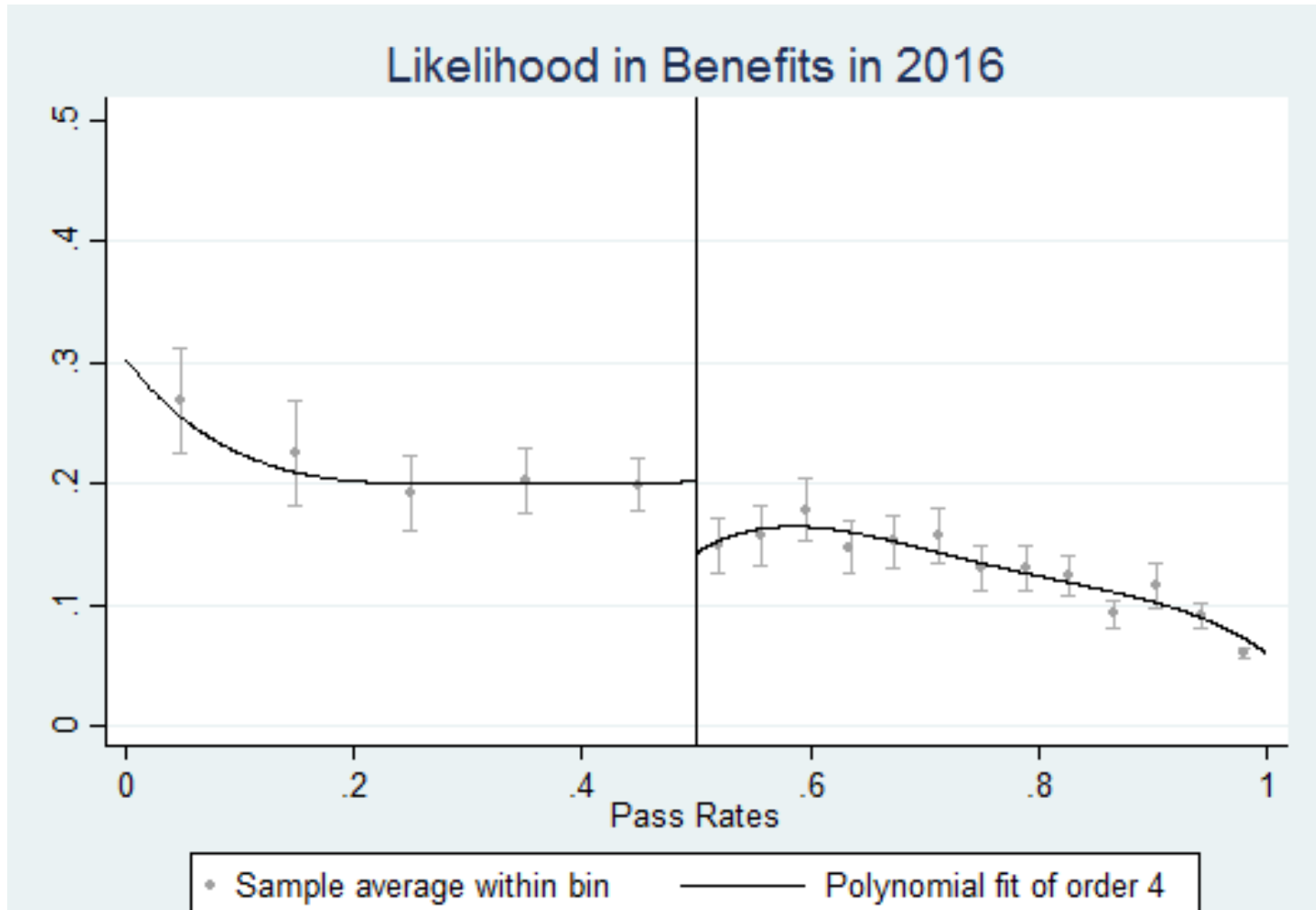
Results on Completion, 0.4 – 0.6 BW

	(1)	(2)	(3)	(4)	(5)	(6)
	1 st Stage			Reduced Form		
	Loan			Enrolment		
Treatment	0.097***	0.090***	0.110***	0.050**	0.045*	0.056*
	(0.023)	(0.023)	(0.033)	(0.024)	(0.024)	(0.034)
Controls	No	Yes	Yes	No	Yes	Yes
Polynomial	Linear	Linear	Quadratic	Linear	Linear	Quadratic
Bandwidth	0.1	0.1	0.1	0.1	0.1	0.1

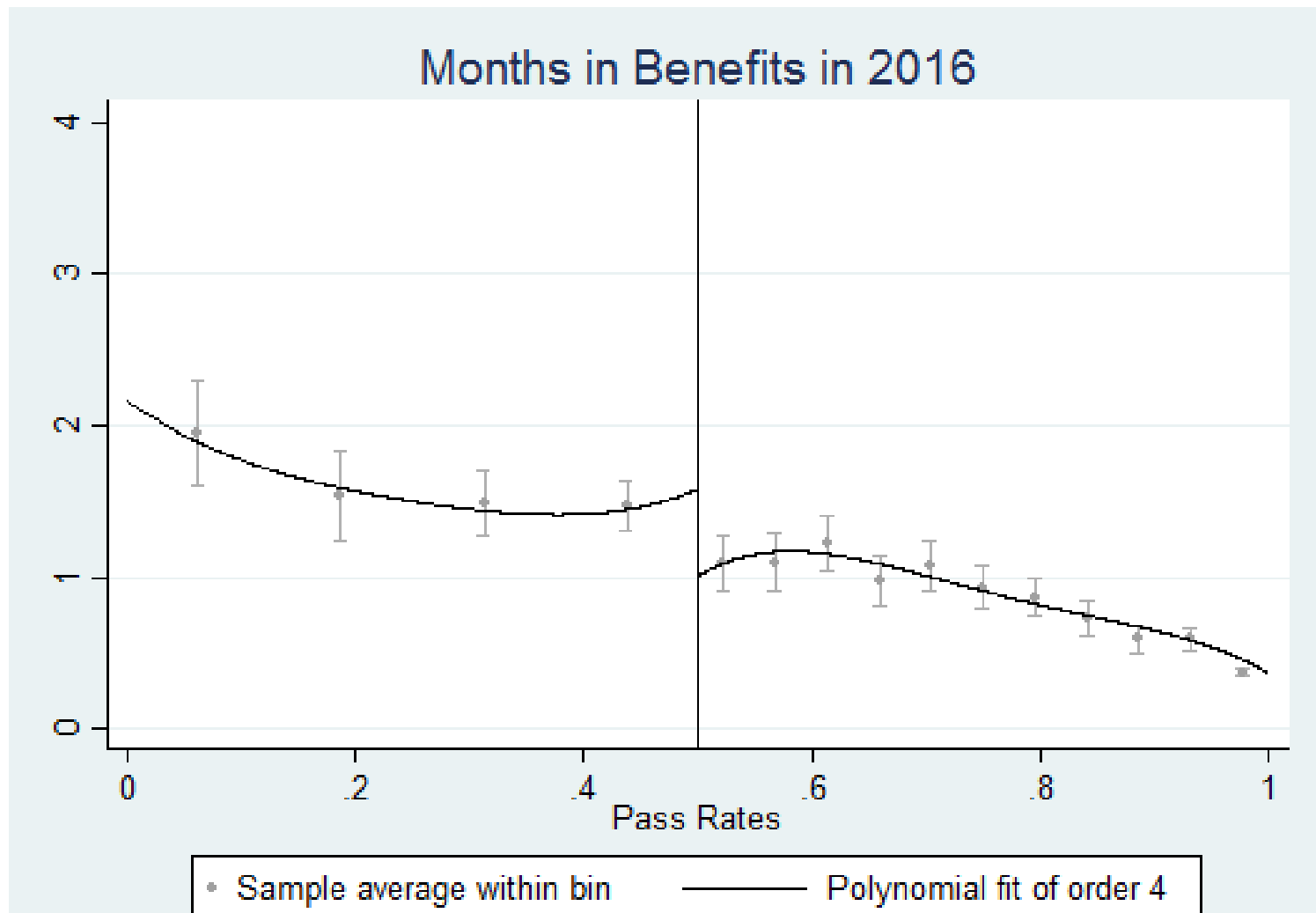
Discontinuity on 2016 Earnings



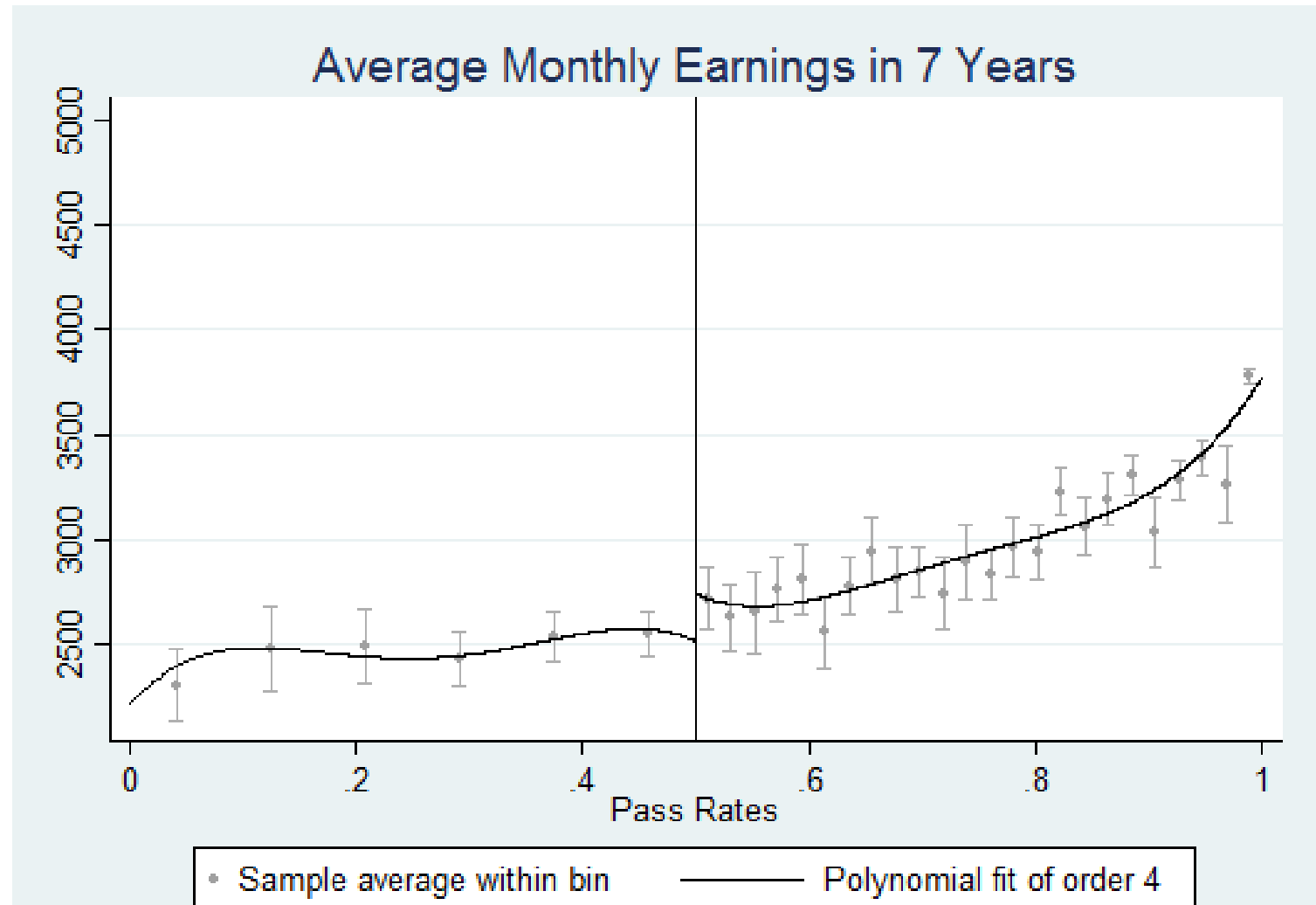
Discontinuity on 2016 Benefit Status



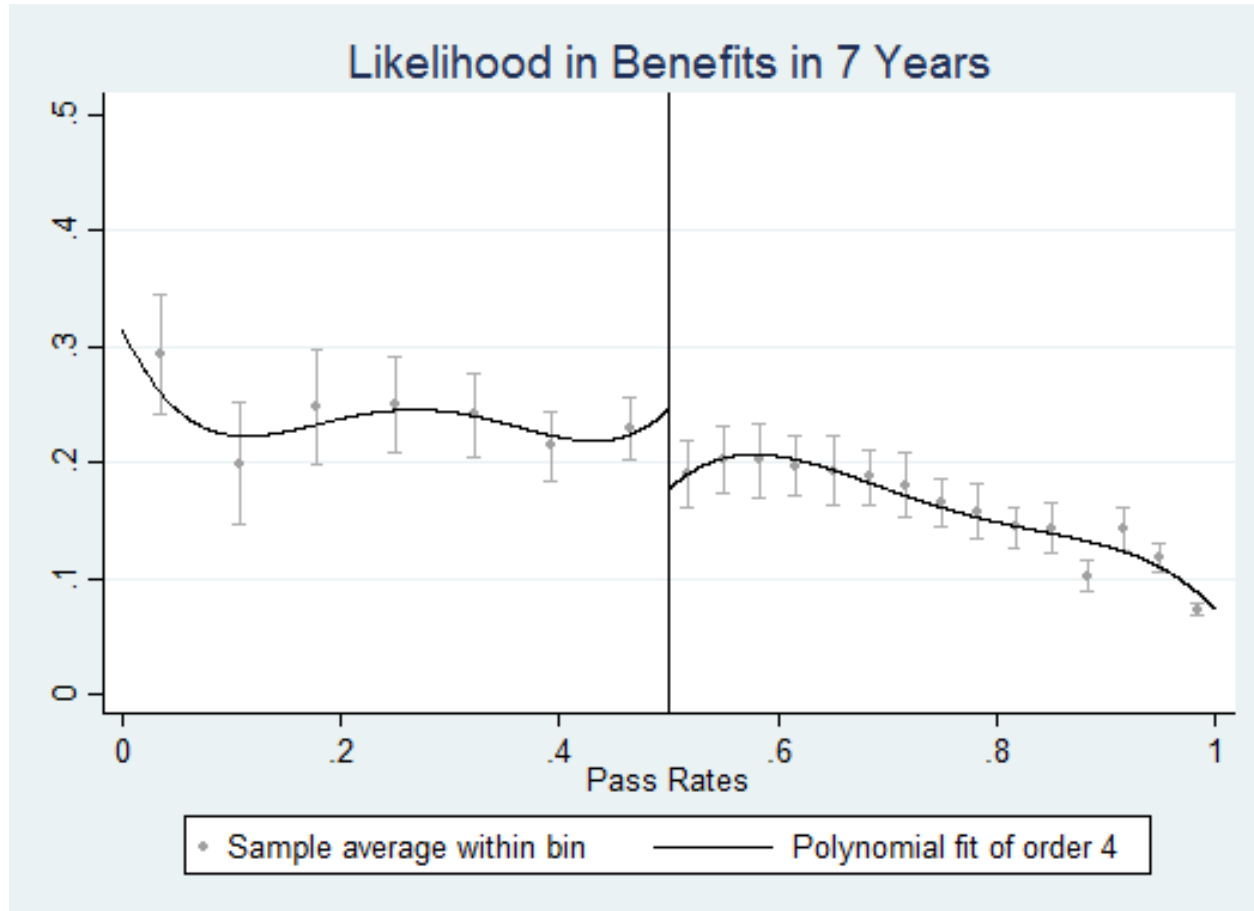
Discontinuity on 2016 Benefit Months



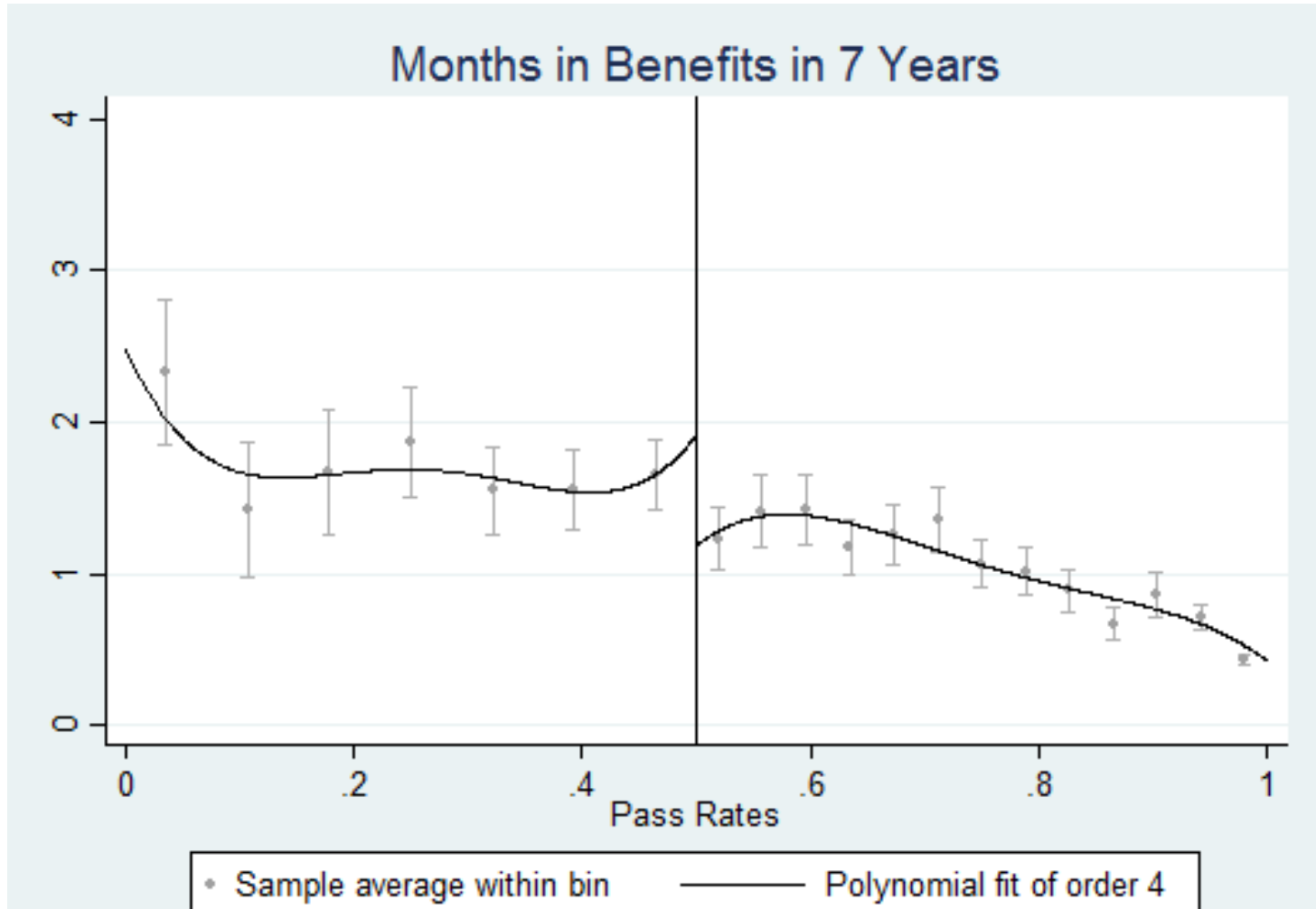
Discontinuity on 7-yr Earnings



Discontinuity on 7-yr Benefit Status



Discontinuity on 7-yr Benefit Status



Summary

- Students just below the cutoff are around 5 p.p. less likely to continue tertiary education
- Students just below the cutoff are around 5 p.p. less likely to complete a BA degree (4 p.p. in 5 years.)
- The causal effects of loan access on continuation and completion are huge: around 70 p.p. and 50 p.p., respectively
- There appears to be no effect on earnings, however, some evidence suggest that loan access reduces the likelihood and length in welfare benefits.