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Financing Higher Education in Vietnam: Student Loan Reform

Dung Doan, Jiacheng Kang and Yanran Zhu

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Dung Doan is a Research Associate on CGHE's social and economic impact of higher education research programme. dung.doan@anu.edu.au

Jiacheng Kang is a PhD candidate at the Australian National University. His research interests include labour economics and economics of education.

Yanran Zhu is a PhD candidate at the Australian National University. Her research focuses on labour economics and education economics.

Abstract

As developing countries transition into more knowledge-based capital-intensive economies, human capital deepening plays a critical role. This in turns depends on an efficient and sustainable higher education financing system. This paper examines the potential of reforming the higher education student loan in Vietnam – a rapidly aging middle-income country – as a solution to further invest in human capital and meet the country's evolving demand for skilled labour. The paper reports that Vietnam's current student loan scheme not only supports a negligible number of credit-constrained students amidst rising tuition fees but can also create excessive repayment burden to debtors. The paper then explores three potential income-contingent loan schemes and analyses how they might perform in Vietnam with respect to government subsidies and debtor's repayment experience. Using data from the Vietnam Household Living Standard Survey 2012-2016 and the Labor Force Survey 2016 and a recent econometric innovation that involves Copula functions to project graduate lifetime earnings, the paper makes clear that it is feasible to design an income-contingent loan scheme that is both gentle on the fiscal budget and generous on borrowers in terms of borrowing limit and repayment obligations.

JEL Codes: I22, I28, H52, H81

Keywords: higher education financing, student loans, income-contingent loan, time-based repayment loan, human capital investment, middle-income trap, Vietnam

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Introduction

East Asian developing countries have been a major engine of global economic growth in the last four decades, with GDP per capita growing at double digits in China and in the healthy range of 4-7 percent per year in many others. Their spectacular growth has generally been propelled by an abundant pool of young workers and a labour-intensive export-oriented manufacturing sector. Yet rapid population aging has threatened, or will soon threaten, the sustainability of this growth model in many countries, notably China, Mongolia, Sri Lanka, Thailand, and Vietnam (ADB 2011, United Nations 2015). As the pool of cheap labour dwindles, human capital deepening is vital for such countries to transition into more knowledge-based and capital-intensive economies and reach high-income status. Different countries approach this challenge differently, but they often have one issue in common: a lack of an efficient higher education financing system.

Vietnam is an example of this problem. Its economic growth since the early 1990s – averaged 7.3 percent pa – has been fuelled by a young labour force with strong literacy and numeracy skills. About 900,000 additional workers joined the work force annually during 1990-2018 and lower secondary net enrolment rate increased from 70.1 percent to nearly universal between 2000 and 2018. However, with the demographic dividend reaching its peak around 2015 (World Bank 2016, p. 12) and labour supply growth slowing down significantly from 2.2 percent per year during 1990-2010 to only 1.3 percent per year during the 2010s, a growing concern is that Vietnam will get old before getting rich. Skills development thus has become even more critical for the country to boost productivity and escape the middle-income trap.

Yet the country's higher education system has been falling short in meeting evolving demand for skilled labour. Compared to upper-middle income neighbours, gross tertiary enrolment in Vietnam is relatively low at 28.3 percent; in Malaysia and Thailand, for instance, the figure is 44.1 percent and 49.3 percent, respectively. Occupational skill shortage is often cited as a major constrain for businesses (World Bank 2014; Montague 2013) and obtaining a domestic degree does not necessarily equip graduates with the skills demanded by employers (Tran 2013, Trung and Swierczek 2009, World Bank 2018a, p. 4).

Expanding access and boosting higher education quality thus have been a central part of Vietnam's development plan, but the higher education system faces a fundamental huddle: the lack of public funding. Public expenditure on higher education has traditionally been dwarfed by that on pre-schooling and basic education. In 2015, higher education received only 5 percent of government spending on education and training, or 0.25 percent of GDP (World Bank 2018b). This is much lower than the GDP share of higher education spending in many East

and Southeast Asian neighbours, such as Singapore (1.0 percent), South Korea (0.94 percent), Malaysia (1.3 percent) and Thailand (0.64 percent)[1].

Notably, in 2015 the government further shifted the cost of higher education towards private sources through the issuance of Decree No. 86/2015/ND-CP. The decree allows public higher education institutions greater financial autonomy and substantially higher tuition fee limits in exchange for a reduction in public funding. Currently being piloted and going to be fully implemented in 2021, the decree raises grave concerns about access and equity.

Within this context of rising tuition charges, Vietnamese students have few options for financial assistance. The public student loan scheme is nearly non-existent, poorly designed and narrowly means-tested – in 2018 less than three percent of enrolled students received government-provided loans. Public grants and scholarships are similarly limited. Commercial student loans, besides being negligible in scale, cannot promote equitable higher education access due to inherent market failures. Asymmetric information and the lack of collateral in case of student loan default mean that potential student debtors are too risky for commercial creditors to lend to (Chapman and Doan, 2019; Friedman, 1995; Barr, 1989). And since the Vietnamese government does not guarantee commercial student loans, students from disadvantaged backgrounds, often without well-off guarantors, are unlikely to have access to commercial credits.

Without an overhaul of this higher education financing system to expand access and improve quality, Vietnam is unlikely to meet the demand for skilled labour to modernise its economy as the population ages and financial barriers to higher education increase. The challenges are two-folded. One is the need to financially support disadvantaged students to promote access and equity. The other is the need for additional funding to expand and improve the quality of higher education institutions. Given the government's tight budget, this makes the policy case for reforming the public student loan scheme into a cost-sharing mechanism to finance higher education, rather than as a social protection policy as it currently is. The policy questions then become: Should the current loan scheme be expanded to support more credit-constrained students or should it be replaced with a new one? If the latter, what are the potential options?

Internationally, there are two types of student loan: traditional, mortgage-type time-based repayment loan (TBRL) and income-contingent loan (ICL). TBRLs, like a mortgage, require fixed repayments over a set period of time and thus are insensitive to debtors' financial circumstances. Vietnam's current loan system falls into this category. In contrast, ICLs require repayment if and only when a debtor's income exceeds a certain threshold and repayment amount is usually capped at a small percentage of debtor's earnings. Since 1989, when Australia first adopted ICL

[1] Source: UNESCO Institute for Statistics. The figure is as of 2013 for Thailand and as of 2016 for Malaysia, Singapore, and South Korea.

nationally, there has been a quiet but solid international revolution in higher education financing away from TBRL and toward ICL. ICLs now universally cover domestic students in New Zealand (1992), England (1998) and Hungary (2001), and partially cover students in the US (1994), Thailand (2006)[2], South Korea (2011), Brazil (2015) and Japan (2017). There are also legislative reforms underway for introducing universal ICLs in Brazil, Colombia, Japan, Malaysia, and Thailand (Chapman et al. 2019).

While still being the less popular form of student loan, ICL has important advantages over TBRL, including protecting borrowers against adverse employment outcomes, providing better consumption smoothing, being more cost-efficient and having little distorting effect on labour supply (Quiggin 2014, Chapman 2016, Long 2019, Britton and Gruber 2019). Furthermore, TBRLs have been found to have detrimental effects on various aspects of borrowers' post-college wellbeing, such as occupational choices, wealth accumulation, and family formation decisions (see, for example, Rothstein and Rouse 2011, Gervais and Ziebarth 2019, Elliott et al. 2013, Cooper and Wang 2014, Walsemann et al. 2015, and Bozick and Estacion 2014).
A growing literature recently explores the potential to implement universal ICLs in Brazil (Dearden and Nascimento 2019), China (Cai et al. 2019), Ireland (Chapman and Doris 2019), Japan (Armstrong et al. 2019), and the US (Barr et al. 2019). These papers all suggest that a well-designed ICL is superior than the country's existing TBRL in terms of expanding higher education access and improving equity in a cost-effective manner, but careful consideration of country-specific context is needed to design an ICL suitable for each country. Recently the Vietnamese government has also started to explore the potential of adopting ICL although the policy discussion is still in an early stage.

Research on student loan reform in particular and higher education financing in general in Vietnam however has been scarce. Probably the only study that examines Vietnam's student loan system is Chapman and Liu (2013), which estimates the financial burden Vietnamese graduates would face under a hypothetical TBRL scheme.

Bridging this gap, this paper examines the implications on debtors and fiscal budget of Vietnam's current student loan system and potential student loan reforms, providing the first policy case study on higher education financing through student loan in Vietnam. The paper reports that the current scheme is not only inadequate to support credit-constrained students amidst rising tuition fees but also creates excessive repayment burden to debtors. The paper then explores the performance of three potential ICL schemes in Vietnam with respect to government subsidies and debtor's repayment experience. Using data from the Vietnam Household Living Standard Survey 2012-2016 and the Labor Force Survey 2016 and a recent econometric innovation that involves Copula functions to project graduate lifetime

[2] The ICL scheme in Thailand operated in only 2006 and was abolished for political reasons.

earnings, the paper demonstrates that it is feasible to design an ICL system that is both gentle on the fiscal budget and generous on Vietnamese borrowers in terms of borrowing limit and repayment obligations.

The paper proceeds as follows: Section 2 describes the current context and issues in higher education financing in Vietnam, followed by Section 3 which concerns the documentation of the data and empirical methodology used to project graduate income and loan performance. The analysis of alternative loan designs and a discussion of important policy implications is presented in Section 4. Concluding remarks and suggestions for future research are reserved for Section 5.

Higher education financing in Vietnam

Public spending and tuition fees

Since 2000, together with robust economic growth and increasing demand for higher education, Vietnam's higher education system has expanded significantly. The numbers of universities and 2-years colleges rose from 178 to 445 whilst the number of enrolled students more than doubled from nearly 900,000 to above 2.1 million within the 15 years between 2000 and 2015[3]. Gross tertiary enrolment rate, although still low, tripled from 9.4 percent to 28.8 percent[4] during the same period.

This expansion in size, however, has not been accompanied by equivalent improvement in education quality. Vietnamese higher education institutions (HEIs) remain mediocre by international standards – despite the QS World University Rankings 2019 listing two Vietnamese universities in the top 1000 for the first time. The teacher-to-student ratio has been persistently low at around 3-4 percent in the last two decades[5], salaries of faculty members are not sufficiently attractive to elicit a dedicated professional commitment, lecturers often lack sufficient academic credentials and most are not involved in research (Hayden and Thiep 2015, World Bank 2016). Additionally, curricula are outdated, teaching equipment is inadequate and there is a lack of a quality assurance system to provide feedback to HEIs (World Bank 2016).

Many of these issues are associated with the system's highly centralised public funding structure. As of 2015, 80 percent of HEIs are state-owned, accounting for 87 percent of enrolled students. It is worth noting that although the number of private HEIs has increased moderately faster than that of public HEIs – by 2.9 times as compared to 2.4 times during 2000-2015, most private HEIs are small and the

[3] Source: Vietnam General Statistics Office
[4] Source: World Development Indicators database
[5] Source: Vietnam General Statistics Office

dominance of the public sector has remained virtually unchanged with the proportion of enrolled students in public institutions hovering between 85 and 90 percent.

Traditionally, public HEIs are fully state-funded and generally lack the authority to control their own resources and make strategic investments (World Bank 2016). While tuition charges exist, fee levels are capped and highly regulated. Most importantly, all tuition fees collected by public HEIs, except those from unsubsidised programs, must be sent to the central bank for redistribution by the government. Public HEIs can access only the tuition fees from unsubsidised programs, which are the minority. Even then, the collected fees must be deposited at commercial banks and any interest earned from such deposits can only be used to provide financial aid to students.

Decree No. 86/2015/ND-CP, issued by the government in 2015, disrupts this structure. The decree allows public HEIs greater financial and management autonomy in exchange for reduction in public funding. In particular, public HEIs that are granted financial autonomy under the decree will no longer receive state funding for their recurrent and capital spending; instead they are allowed to charge substantially higher fees and use the collected fees at will[6]. By 2018, 23 public HEIs have been granted full financial autonomy status, some are still eligible to receive part of their recurrent funding from public finance until 2020, and all public HEIs are scheduled to follow suit after 2021.

While providing public HEIs with the much needed freedom to manage their financial resources and, hopefully, improve their education quality, this decree raises the financial barriers to higher education. The tuition caps for year 2020/2021 for a full-time bachelor's degree at autonomous public universities, for instance, is 2.1 to 3.5 times higher than those in non-autonomous universities (the largest difference is in Medicine). While it is still unclear whether this will push tuition charges up in the private sector, such significant fee increase in the dominant public sector raises concerns about restricting access among credit-constraint students, widening access inequality and undermining the government's efforts to further expand the higher education system.

Vietnam's higher education system already has a high fee-for-service ratio. Tuition fees are estimated to make up 46 percent of the direct cost[7] per enrolled students in the public sector and about 69 percent in the private sector in 2016 (World Bank 2018b). Participation in higher education is, unsurprisingly, highly unequal; the gross

[6] Interests earned from the fees deposited at commercial banks must still be used to provide financial assistance to students.

[7] Per student education cost refers to direct education cost related to students' learning, which comprises of tuition fees and other contributions, including contributions to school construction, parents' fund, uniforms, textbooks, learning materials, extracurricular classes, health insurance, travel costs and fees. Indirect costs for living such as meal, accommodation, clothing and other basic needs are not included.

enrolment rate by household income quintile in 2016 was 52 percent among the top quintile yet only 19 percent among the bottom one. Without a sustainable and effective financial assistance system, the issues of access and equity will likely worsen when Decree 86 is fully implemented in 2021.

Student loan

Amidst heavy fee-for-service ratio and rising tuition charges, Vietnamese tertiary students have few options with respect to financial aid. Government-provided scholarships and grants are small and extremely narrowly targeted based on disciplines, poverty status, and ethnicity. The current student loan scheme, introduced in 2003, is a time-based repayment loan and has limited coverage, low borrowing limit, and various design issues.

Designed as a social protection policy rather than an education financing policy, the loan is available only to tertiary and vocational students from households with income per capita up to 150 percent of the national poverty line – that is, about 16.4 percent of the population, orphans, enrolled students whose households face financial, health or natural disaster shocks during study period, displaced farmers, veterans and rural working-age students in certain vocational fields. In 2018, only 51,145 students (including both tertiary and vocational education) received funding through the scheme, a negligible number compared to 2.1 million enrolled tertiary students. More importantly, about 64 percent of these borrowers were enrolled students facing adverse shocks, the remainder were mostly students from poor and near-poor households. These numbers suggest that the current loan is more a safety net to help students who are already enrolled to continue their study in case of unexpected financial hardship than a financial assistance system that helps credit-constraint students to access university.

Moreover, while targeting students from disadvantaged backgrounds, the loan requires student's parents or guardians to be the official borrowers and responsible for repayment instead of the students themselves. (Almost all loans are disbursed through the students' households instead of directly to students, with a household representative, usually the household head, making the loan application.) This makes understanding how the loan impacts on debtors in Vietnam more complex. Section 4.1. will elaborate this issue.

The current loan size is capped at VND 1.5 million/month (or VND 15 million/year) and can be spent on both tuition fees and living costs. However, given that the (unweighted) average tuition fee at non-autonomous public HEIs is VND 1.1 million per month in 2019/20 and rising, this borrowing limit is insufficient to cover both tuition fees and living costs, especially for students from rural areas who need to rent accommodation. The loan cap is in fact already below the current average tuition fees at autonomous HEIs of VND 2.9 million/month. By the same token, the loan can cover only 84 percent of educational cost in public institutions and 52 percent in

private institutions as the annual per student cost in public and private tertiary institutions in 2016 were VND 17.8 million and VND 28.8 million, respectively (World Bank 2018b).

Besides its limited coverage and low borrowing cap, the scheme also features short repayment duration and a high interest rate. Borrowers are required to start repaying 12 months after finishing their study, with repayment frequency of at least one every 6 months. For tertiary programs, the repayment period equals the duration that the borrower received funding, with a maximum extension of half of the original maturity. Undergraduates pursuing a four-year degree thus would have at most six years to pay off their debt, much shorter than what their counterparts are entitled to in many countries, such as Brazil (12 years), China (23 years), Japan (18 years), Malaysia (20 years), and South Korea (20 years).

Nominal interest is set at 6.8 percent per annum and starts incurring from the date the loan is disbursed. Given the average inflation rate of 2.6 percent per annum during 2014-2018, this is equivalent to a hefty positive real interest rate of about 4.2 percent. Without paying interest during study period, an undergraduate would have an outstanding debt of VND 71 million at the end of her/his four-year degree, which is equivalent to 1.4 times the average starting annual salary of bachelor's degree holders. Overdue payment incurs an interest penalty of 130 percent of the original interest rate.

These poor design features and the demand for skilled labour make a policy case for a student loan reform in Vietnam. The current loan scheme not only fails to sufficiently cover students in need of funding to finance their degree but also creates heavy repayment burdens to borrowers, as will be shown in Section 4.1 below. A better scheme would have broader coverage, higher loan cap, softer repayment terms, and be financially sustainable so that it not only promotes equitable access to higher education but also helps expand Vietnam's higher education system.

Concepts, Data and Methodology

Analysing student loan performance and its implications on the government's budget requires reliable estimation of the repayment obligations and income of each debtor over their repayment period. These two pieces of information allow us to understand the financial difficulty that borrowers face in repaying their debts as well as the cost to the government when debtors do not repay in full. While the repayment amount is relatively straightforward to calculate from loan parameters, the projection of debtors' income over their repayment duration (or generally, over their life course) is more challenging. The following sub-sections describe the data and estimation method used to conduct this empirical task as well as the concepts of repayment burden and government subsidy used in the subsequent analysis.

Repayment burden and government subsidy

The financial difficulty faced by debtors to repay their debt in full and in time, or the "repayment burden", is conventionally calculated as

$$RB_{it} = \frac{L_{it}}{Y_{it}}$$

where L_{it} is the repayment amount of student loan in period *t* of debtor *i* and Y_{it} is debtor *i*'s own income in the same period. This repayment-to-income ratio represents the percentage reduction in a debtor's income after they use it to service their student debt. Simple to calculate, easy to interpret, and free from potential bias of debtor's subjective perceptions, the ratio has been widely used by both governments and researchers to gauge the extent of loan stress. See, for instance, the US Department of Education (2017), Baum and Schwartz (2006), and Chapman and Doris (2019).

The ratio, however, does not capture the possibility that debtors might receive financial support from others to repay their debts and the essential consumption that they are likely to prioritise over student debt repayments. Doan (2019) demonstrates that the ratio might overstate the financial difficulty associated with repaying student debt, especially when a significant proportion of young graduates are financially dependent on their families. The author also proposes two alternative indicators of repayment burden that capture essential consumption and the potential of income sharing within debtor's households. However, due to lack of data on household income and consumption to construct these indicators, this study is prepared to use the conventional repayment-to-income ratio and exercise some caution when interpreting the findings in subsequent sections.

From the government's perspective, a key question in assessing student loan performance is how much the government needs to subsidise when repayments fall short of the borrowed amount, which arises from both non-repayment on the debtor's part and the difference between the loan's interest rate and the government's cost of borrowing. Following Chapman and Doan (2019), this paper calculates the government's loan subsidy as follows:

$$\frac{PvDebt - PvPay}{PvDebt}$$

The present value of the flow of repayments is

$$PvPay = \sum_{t} \frac{Pay_t}{(1+d)^{t-a}}$$

where Pay_t is the repayment amount at age t in real prices, *a* is the age at which the debtor started university, and d is the government's discount rate.

The present value of the debt upon graduation is calculated as

$$PvDebt = \frac{\sum_u Loan_u(1+s)(1+r)^{U-u+1}}{(1+d)^U}$$

where $Loan_u$ is the loan amount taken out by the student in year *u* of university (*u=1,2,..U*). The number of years of attending university is given by *U* and the first repayment is made at age *t=a+U+1. r* represents the real interest rate on the loan and *s* is the loan surcharge. It should also be noted that this formula does not capture the indirect subsidy that arises from administrative and collection costs, which is ignored in this study due to lack of data.

Data

To estimate lifetime income of Vietnamese graduates, this paper employs two data sources, the Vietnam Household Living Standard Survey (VHLSS) 2010-2016 and the Labor Force Survey (LFS) 2016. The VHLSS is a nationally representative rotating panel survey conducted every two years. Its panel feature allows us to capture how graduates transition along the age-specific graduate income distribution overtime, yet its small sample size undermines the reliability of its graduate income distribution. The LFS, on the other hand, offers a much larger sample and thus can compensate for the VHLSS's sample size shortcoming.

This empirical exercise includes bachelor's degree holders aged between 23 and 60 years old. Vietnam's official retirement age is 55 for females and 60 for males, thus graduates aged 61 and above are ignored in this analysis. The five rounds of VHLSS 2012-2016 contains 2,882 graduates (1,437 males and 1,445 females), with each graduate appearing in at least two consecutive rounds of the survey. From the LFS, a sample of 48,629 graduates is constructed. Summary statistics for the VHLSS and LFS samples are presented in Tables 1 and 2, respectively.

		All graduates	Male graduates	Female graduates
Total income in 2010 (VND '000)	Mean	65,540.00	76,400.31	53,719.95
	(SD)	(61436.74)	(76203.35)	(36191.76)
Total income in 2012 (VND '000)	Mean	72,367.25	82,225.40	62,084.83
	(SD)	(57792.91)	(70014.30)	(38878.03)
Total income in 2014 (VND '000)	Mean	80,023.84	90,261.63	70,300.00
	(SD)	(64080.15)	(71505.95)	(54441.2)
Total income in 2016 (VND '000)	Mean	84,231.90	95,189.00	73,892.56
	(SD)	(63507.18)	(73024.62)	(50974.15)
Age in 2010 (in years)	Mean	37.8	39.0	36.6
	(SD)	(10.4)	(10.5)	(10.1)
Proportion of graduates with zero income	2010	10.7%	12.8%	8.4%
	2012	10.7%	12.1%	9.1%
	2014	11.6%	12.3%	11.0%
	2016	9.9%	11.0%	8.9%
Proportion of graduates not working	2010	14.9%	15.8%	14.0%
	2012	14.4%	14.3%	14.4%
	2014	15.3%	15.4%	15.3%
	2016	14.8%	15.7%	13.9%
No. of graduates	2010	449	234	215
	2012	807	412	395
	2014	971	473	498
	2016	655	318	337
	All	2,882	1,437	1,445

Table 1: Summary statistics of VHLSS panel

Note: Income refers to total pre-tax labour income. All incomes were inflated to 2016 price level using the official annual CPI.

Total income in 2016 (VND '000)	Mean	78,955.26	89,498.15	68,175.15
	(SD)	(69193.01)	(81221.26)	(52039.1)
Age in 2016 (in years)	Mean	37.3	38.8	35.7
	(SD)	(9.9)	(10.2)	(9.2)
Proportion of graduates with zero income		10.3%	8.3%	12.4%
Proportion of graduates not working		18.8%	17.3%	20.4%
No. of graduates		48,629	24,585	24,044

Table 2: Summary statistics of LFS

Note: Income refers to total pre-tax labour income. All incomes were inflated to 2016 price level using the official annual CPI.

Due to lack of data, this study can neither distinguish graduates with and without student debts nor include non-graduate debtors. While this is not ideal, given Vietnam's current insignificant loan coverage and the need for broader coverage, using data of all graduates in our analysis probably provides a more reliable estimation of how potential loan schemes are likely to perform in the country. Also, while non-graduate debtors are likely to have lower income and thus heavier loan stress than those who obtain their degrees, omitting them is unlikely to significantly influence the comparison of alternative loan schemes' performances.

Methodology

Graduates with lower income are more likely to face repayment difficulty, less likely to pay off their debts, and if they do, take longer to do so. Approximating future income of graduates with different patterns of life-time income is therefore critical to understand debtor's repayment experience and the government's collection prospect. In fact, the projection of lifetime income is vital in many areas of economics other than student loan analysis, such as income inequality and taxation; and various estimation approaches have been employed to undertake this task.

Several studies on student loan repayment use static estimation approaches to estimate the age-income profiles of graduates based on cross-sectional data and conduct their analysis by graduate income quantiles. Examples include Chapman and Lounkaew (2010), Chapman and Liu (2013), Chapman and Suryadarma (2013), Chapman and Doris (2019) and Cai *et al.* (2019), who used unconditional quantile regression, and Doan (2017) who used OLS to smooth raw income quintiles over a polynomial function of age. While these studies improve on earlier works that estimated repayment burden only for the average graduate such as Ziderman (2003), they, by inferring lifetime income from cross-sectional data, rely on an unrealistic assumption that graduates stay at the same position on the age-specific income distributions through their life. This leads to a considerable underestimation

of how much a debtor repays in an ICL scheme, where payment is only required when the debtor's income exceeds a certain threshold (Dearden 2019).

Incorporating income dynamics in student loan analysis is therefore critical. In labour economics, there is a long tradition of estimating structural models of income dynamics from panel data, starting from Lillard and Willis (1978) and MaCurdy (1982) to more recent works by, for instance, Heathcote *et al*. (2010). In the context of student loan analysis, Higgins and Sinning (2013) and Higgins (2011) use a variance component approach to model income dynamics where the permanent and transient income shock are estimated using non-parametric methods.

Most recently, Dearden (2019) proposes a new approach that estimates income dynamics with only a short panel of income data and without relying on employment status and other demographic information of the graduates. This approach involves estimating a Copula function that best approximates the probability that a graduate moves from one position on the age-specific income distribution to another over time. The approach has been adopted in student loan analysis for the US (Barr *et al*. 2019), Brazil (Dearden and Nascimento 2019), and Japan (Armstrong *et al.* 2019).

Copula approach

This paper adopts the dynamic estimation approach proposed by Dearden (2019) with some adjustments to generate lifetime income projections for graduates. The key difference between this paper and Dearden (2019) is that the later uses only one panel dataset whereas this paper relies on two data sources due to the small size of the panel sample from the VHLSS. We use the VHLSS panel data to predict how graduates transition from one income percentile to another along the age-specific income distribution over their life course, then link each graduate's predicted income percentile at each age with a corresponding income level extracted from the LFS age-specific income distribution. This results in a panel of graduate income spanning over their working life; all monies are inflated to 2016 price level using the official annual CPI.

This approach involves three main steps as follows.

i. Estimate static age-income profiles by smoothing raw income percentiles over a polynomial function of age.

Raw income percentiles by age are calculated from the LFS cross-sectional sample – for males and females separately – and regressed against a polynomial function of age. Based on the Bayesian Information Criterion, the quintic function is found to best capture the fluctuation of graduate income over age, especially for those below 30 years old, who tend to have lower income and are more prone to student loan

repayment difficulty. Appendix A displays the raw and smoothed age-income profiles for both genders.

ii. Use Copula function to model the joint distribution of the adjoining continuous marginal cumulative distribution functions (CDF) [8] of income at each age in the VHLSS data.

Following Dearden (2019), this exercise aims to find the bivariate Copula function that best captures the joint distribution of the adjacent income percentiles for each age transition from 23 to 60. The VHLSS's panel sample, however, is too small to provide a reliable model of the transitions between consecutive ages. To boost sample size, this paper pools data from the five waves 2012-2016 of the VHLSS to form a two-period panel, then model the transitions between two adjacent age ranges, with each range spanning 3 years, that is, from ages [*t, t+1, t+2*] to ages [*t+1, t+2, t+3*].

The Akaike Information Criterion (AIC) was used to pick the best Copula amongst all the bivariate Copula families available in the BiCopSelect function of R's "VineCopula" package. As was the case for the US (Dearden, 2019) and Brazil (Dearden and Nascimento 2019), the t-Copula is found to provide the best fit for most age ranges for both males and females.

Once the appropriate Copula function – the *t*-Copula in this case – to formalise the dependence structures of the graduates' income distribution has been determined, R's "Copula" package is used to estimate the relevant parameters of t-Copulas, the correlation parameter rho (ρ) and the degree of freedom (ν), at each age. These parameters are then smoothed over age to be used in the simulation step below. See Appendix C for the estimated ρ and ν, their 95% confidence interval, and their age-smoothed values.

iii. Simulate two hypothetical samples of 10,000 observations each for males and females separately to project graduate future income over their lifetime.

Debt repayment performance based on debtor's income should be analysed for males and females separately because of the gender wage gap. To accommodate this, the paper simulates two samples of the same size (10,000 observations): one sample for female graduates and one for male graduates. The simulation for gender involves the followings.

- Step 1: Drawing a sample of 10,000 graduates aged 23 with replacement from the VHLSS panel sample.

[8] The marginal CDFs are uniformly distributed between 0 and 1 and hence can be easily mapped onto the percentile estimates of the marginal distributions at each age once the simulations have been completed.

- Step 2: Estimating the conditional distribution function of u_{24} given u_{23} which is given by:

$$C_{u_{23}}(u_{24}) = \frac{\partial}{\partial u_{23}} C_{23}(u_{23}, u_{24})$$

  where *C23* is the estimated t-Copula with parameters ν and ρ from our age-smoothed estimates at age 23, and u_t is the income CDF at age *t (t=23, .. 58)*
- Step 3: For each sample, generating a random standard uniform variable r with the same dimension as u_{23}, i.e. 10,000 observations.
- Step 4: Generate $u_{24} = C_{u_{23}}^{-1}(r)$ to get the uniformly distributed predicted income rank at age 24 which has a stochastic element due to the rank prediction being determined by the draw from the random uniform function.
- Step 5: Repeat steps 2 to 4 above for each sequential age.

Once the relative income ranks of these graduates have been simulated, they are linked to the corresponding age-smoothed income percentiles by age and gender derived from the LFS 2016 and projected to grow in real terms as a result of productivity growth over time. Real income growth is assumed to be 3.8 percent per annum over the lifetime of graduates, based on the average aggregate labour productivity growth rate in during 2000-2013 (World Bank, 2016, p. 134). The hypothetical samples are also re-weighted by gender to reflect the sex ratio among Vietnamese graduates in 2016.

Estimated t-Copulas and simulated graduate income

How do our simulations perform in terms of generating a realistic projection of graduate lifetime earnings? The first criterion is the prediction accuracy of the estimated t-Copula function when projecting graduate future income one year ahead on the VHLSS panel sample. As can be seen in Figure 1, the distribution of predicted income follows the actual distribution quite closely, especially for female graduates. The estimation only slightly overestimates income changes between adjacent ages (see Figure 2).

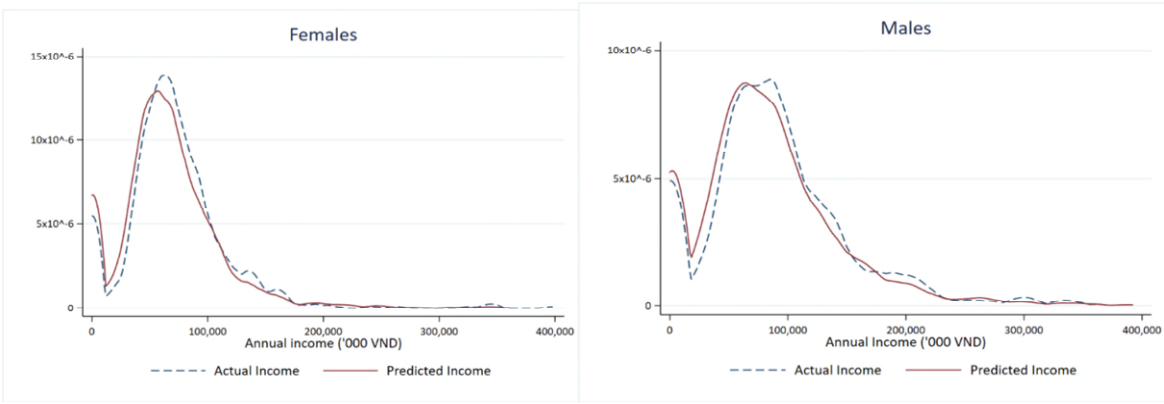

Figure 1: Distribution of actual and predicted graduate income from the VHLSS

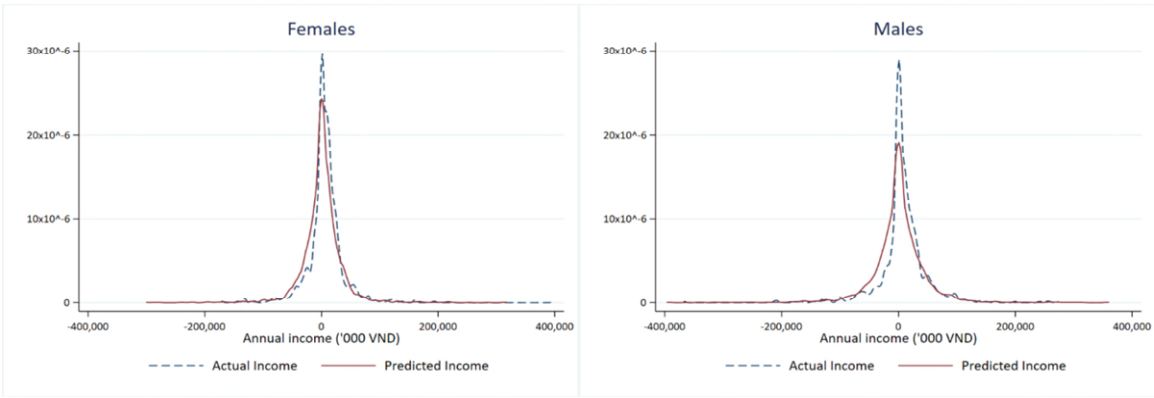

Figure 2: Distribution of actual and predicted income changes

Another criterion is the Kendall's tau, which measures the rank correlation or the degree of concordance of the graduate earnings CDF's at adjacent ages. (See Dearden (2019, Appendix B) for further details about the calculation of Kendall's tau). As shown in Figure 3, the actual Kendall's tau from the VHLSS panel, the Kendall's tau predicted by the t-Copula on the VHLSS sample, and the Kendall's tau from the simulated samples are highly similar across most age groups for both males and females. This indicates the selected t-Copula does a good job in predicting income dynamics and that the income dependence between consecutive ages in the simulated samples closely mimic that in the actual data.

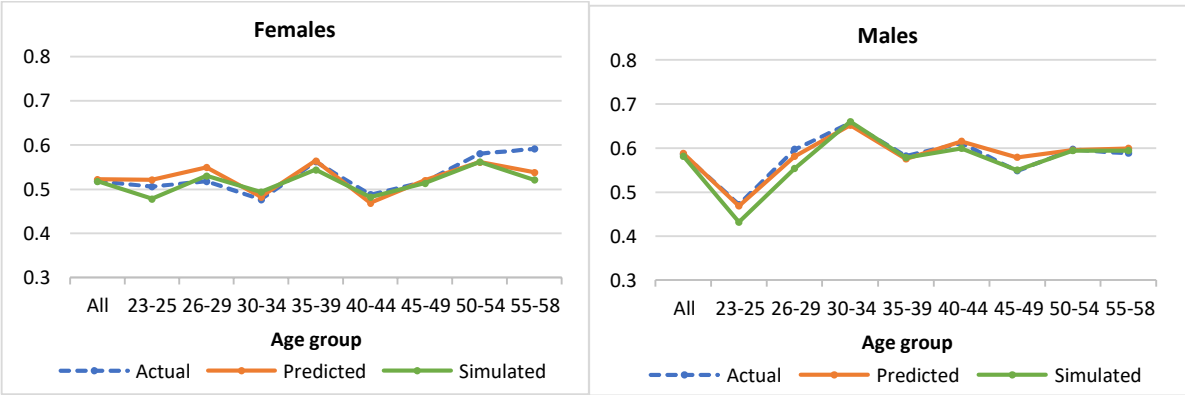

Figure 3: Kendall's tau from the actual, predicted and simulated income

Given that the estimated t-Copula predicts income dynamics well in the VHLSS and simulates dynamic patterns that are closely similar to actual ones, how does it fair when we combine the VHLSS dynamics and the LFS distribution of income level? The simulated income distribution is found to be reasonably close to the actual distribution from the LFS (see Figure 4 below), except at the lower tail of the distribution. The repayment burdens of Vietnam's current time-based student loan and the repayment profile under proposed income-contingent loan schemes are estimated based on lifetime income of these simulated samples.

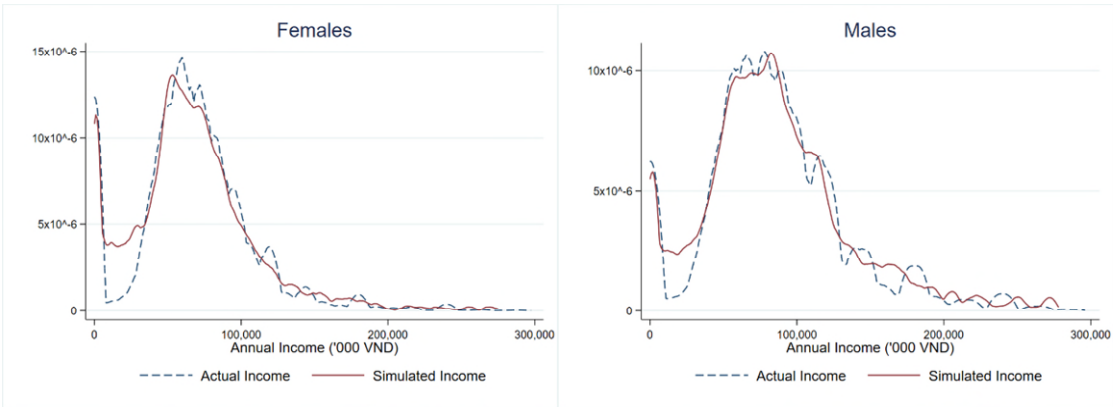

Figure 4: Distribution of actual and simulate graduate income from the LFS

Results

Before contemplating an income-contingent loan for Vietnam, an intuitive question is, Should the current time-based repayment loan scheme be expanded and/or revised to better cover credit-constraint students? This question can be addressed by an examination of its repayment burden on borrowers in Section 4.1. The following

sections then proceed to describe three potential ICL designs and how they might perform in Vietnam in terms of debtor's repayment experience as well as government subsidy and recovery rates.

Repayment burdens associated with the existing time-based repayment loan

Figure 5 displays the estimated repayment burden (RB) associated with Vietnam's current loan scheme for bachelor's degree holders who borrowed to finance their four-year degrees and, thus, have four years after graduation to pay off their debts. The RB is estimated for each graduate income decile over a four-year repayment period. In other words, the estimates in the figure represent the financial difficulty associated with repaying the loan that debtors at each decile of the age-specific graduate income income distribution would face given their earnings and no financial support from any private or public source.

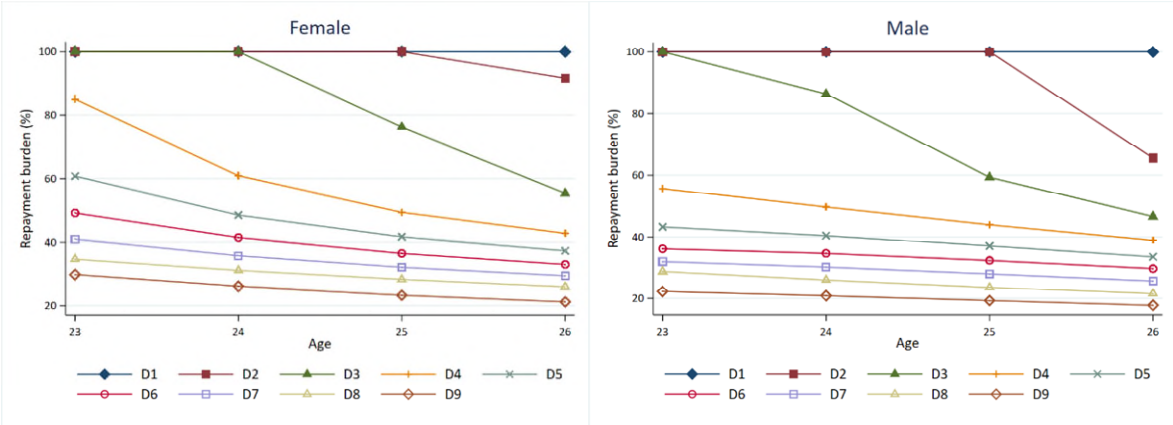

Figure 5: Repayment burdens associated with the current loan scheme by gender

Note: Given the current loan's low borrowing limit, graduates are assumed to borrow the maximum amount allowed, i.e. VND 15 million/year, for four years to finance their degree. (All bachelor's degrees in Vietnam take four years to complete). This entails an outstanding debt of VND 71 million at graduation. Graduates are also assumed to pay no interest during their study time, finish their study at age 22 and start repaying at age 23, 12 months after their graduation as allowed by the scheme. For presentation purpose, repayment-to-income ratio that exceeds 100% is displayed as 100% in the figure.

The repayment burden appears excessive for a considerable portion of graduates when they start repaying and remains so for the whole repayment duration for those at the bottom of the earnings distribution, especially females. It is plainly impossible for the poorest 20 percent of graduates (both male and female) to meet their debt obligations with their earnings in the first 3 years since repayment amount either equals to or exceeds their earnings. The repayment-to-income ratio stays above 40

percent for about half of graduates in their first two years of repayment, and for about 40 percent of graduates for the whole debt maturity.

Linking the estimates in this study to the literature on repayment-to-income benchmarks for manageable student debt levels provides a sense of how heavy the burdens are for Vietnamese graduates. Various benchmarks have been proposed, ranging from 5.4 percent of income (Horch, 1978, p.5) to 18 percent (Salmi 2003, p.15), yet even the most generous one – 18 percent – is far below the estimates documented in this study. Even the 90th percentile of graduates (both females and males) is estimated to have RBs above this threshold during their first three years of repayment. Without financial support from private or public sources or considerable non-labour income, it is likely that the majority of Vietnamese graduates would face excessive default risk and consumption difficulty due to their student loan obligations.

Will the burden subside if the current scheme is modified to provide substantially longer repayment duration of 10 years? Unfortunately, the answer is No. This more generous TBRL would still create RBs above the 18 percent threshold for about half of debtors in their first four years of repayment (Figure 6).

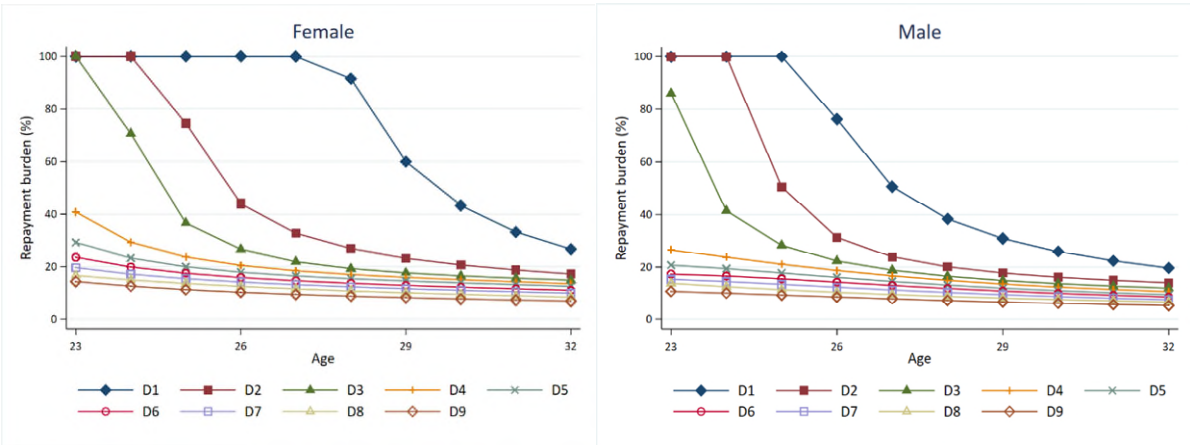

Figure 6: Repayment burdens associated with a more generous TBRL by gender

These findings echo results from previous studies for a wide range of countries. To put them in comparative context, Figure 7 displays the estimated RB for Vietnam alongside those reported in similar exercises for Brazil (Dearden and Nascimento, 2019), China (Cai *et al*. 2019), Chile (Chapman and Dearden, 2018), Colombia (Penrose, 2017), Indonesia (Chapman and Suryadarma, 2013), Ireland (Chapman and Doris, 2019), Japan (Armstrong *et al*. 2019), South Korea and the US (Doan, 2019) and shows how consistently high RB associated with TBRLs can be. In almost all cases, the ratio is highest in the first year after graduation, when graduate earnings are at the lowest, with the exception being Japanese females, whose ratio becomes substantial from age 29 onwards and exceeds 100 percent at age 31 when

a large proportion of graduate women leave full-time employment after marriage and/or first child birth (see Armstrong *et al.* 2019).

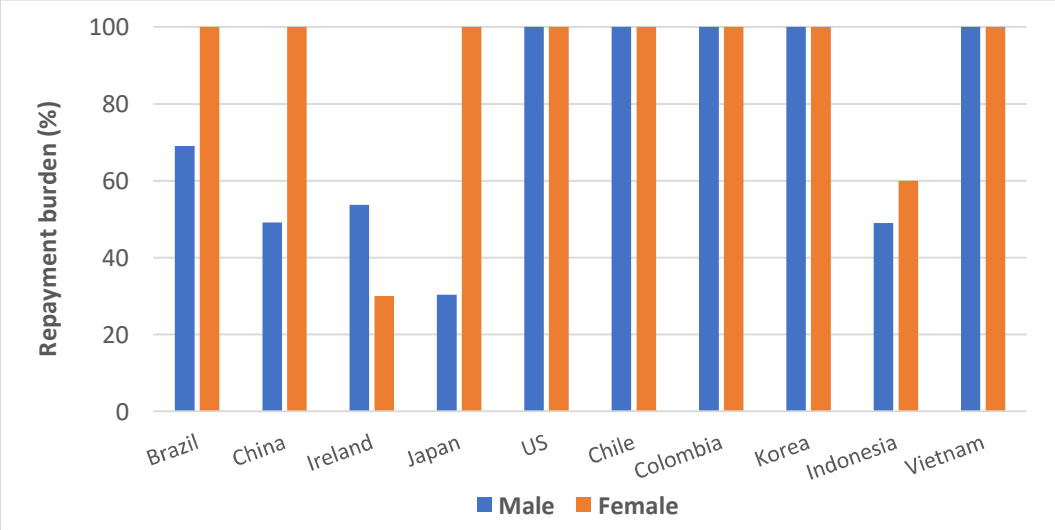

Figure 7: Maximum repayment-to-income ratio for the bottom 20% of graduates aged 23-31*

* For presentation purpose, repayment-to-income ratio that exceeds 100% is displayed as 100%. The ratio is calculated with respect to pre-tax labour earnings in the cases of Brazil, Chile, Colombia, Indonesia, Japan, the US, and Vietnam, pre-tax total individual income in the case of China, and post-tax earnings in the cases of Ireland and South Korea.
Source: Author's calculation and reproduced from Chapman and Doan (2019).

Such excessive RBs under the current TBRL scheme can have detrimental impacts on various aspects of debtors' post-college wellbeing. Heavy repayment burdens drive debtors into consumption hardship and, in severe cases, default and consequential loss of credit reputation and future access to other loans. Even in the absence of default, liquidity constraint due to student debt obligations have been found to adversely affect debtors' occupational choice and lifetime income (Rothstein and Rouse 2011; Gervais and Ziebarth 2019), house ownership and wealth accumulation (Elliott *et al.* 2013; Cooper and Wang 2014), economic mobility (Elliott and Rauscher, 2018), mental health (Walsemann *et al*. 2015), and marriage and fertility decisions (Bozick and Estacion, 2014; Gicheva, 2016; Nau *et al.* 2015).

The impacts of student debt obligations might be even more complex in Vietnam. Contrast to the heavy estimated RBs above, the proportion of outstanding debt being overdue has been consistently low – it was well below 1 percent during 2007-2017 and reached merely 1.1 percent in 2018. The explanation of this seeming discrepancy could lie in both Vietnam's idiosyncratic loan feature and the shortcoming of the repayment-to-income ratio as a measure of repayment difficulty.

The current loan scheme requires that a parent or guarantor of the student is the formal borrower and responsible for debt repayment; it is therefore unclear whose money is used to repay the debt. If it is the parents who repay, families that expect low future income would be less likely to borrow and the purpose of assisting students from disadvantage background to access higher education is undermined. If it is the graduates who make repayment, the repayment-to-income ratio, as discussed earlier, does not capture the possibility that they might receive financial support from their family, either directly to help repay their debt or indirectly through intra-household income sharing. It should also be noted that parents paying for their children's education is a social norm in Vietnam. Hence, measuring RB based solely on graduate debtor's income might not fully capture the financial difficulty associated with repaying student debt. This however does not mean that the current loan is benign because if a debtor needs financial support from their family to fulfil repayment obligations, it means that the debt affects not only the debtor but also their family members through reduced disposable income.

Amidst the need to increase both borrowing limit and loan coverage to better promote higher education access and equity, TBRL is not, apparently, the optimal choice for Vietnam; nor does it appear to be for any country (Barr *et al*. 2019). The most critical problem with TBRL is the lack of a built-in mechanism to protect debtors against income shock and adverse labour market outcomes. Repayment obligations under TBRL, no matter how small, ignores debtor's capability to pay and thus will always cause difficulty for those who earn no income. A well-designed ICL can provide better consumption smoothing and insurance against adverse labour market outcomes to debtors and potentially generate higher revenue for the government (Barr *et al*. 2019, Chapman 2016).

Possible income-contingent loans for Vietnam

Unlike time-based repayment loans, which typically feature loan size, interest rate and repayment duration, an income-contingent loan features some additional parameters. They include income threshold(s), above which debtors have to pay a certain portion of their income, repayment rate(s) associated with each income threshold, surcharge, and forgiveness. The repayment rate can be either gross rate or marginal rate – with gross repayment rate, debtors pay a certain percent of their income when their income exceeds the threshold, whereas with marginal rate, debtors pay a certain percent of their income above the income threshold. For an in-depth discussion on desirable characteristics and design parameters of an ICL, see Barr *et al.* (2019).

This paper tests three potential ICL schemes, two of which follow the loan designs in Australia and New Zealand, where ICLs have been well-established and fuelled a cost-effective expansion of the higher education system[9]. The last one is designed in

[9] Readers interested in the performance of the ICLs in Australia and New Zealand could refer to Norton and Cherastidtham (2016), Norton *et al*. (2018), and New Zealand Student Loan Scheme

an attempt to balance the trade-off between protecting borrowers against repayment hardship and the costs to the public purse. The schemes' parameters and underlying assumptions are displayed in
Table **3**, with key features as follows.

	Scheme A ("Australian" design)		**Scheme B ("New Zealand" design)**		**Scheme C**	
Loan size per year (000' VND)	20,000		20,000		40,000	
Loan surcharge	15%		0%		5%	
Real interest rate	0%		-3.4%		1.4%	
Government cost of borrowing	1.4%		1.4%		1.4%	
Forgiveness	None		None		None	
Type of repayment rate	Gross rate		Marginal rate		Marginal rate	
Repayment arrangement	Income threshold (VND '000/month)	Repayment rate	Income threshold (VND '000/month)	Repayment rate	Income threshold (VND '000/month)	Repayment rate
	<4,500	0%	< 2,250	0%	< 4,200	0%
	4,500-5,196	1%	≥ 2,250	12%	4,200-4,999	2%
	5,197-5,508	2%			5,000-5,999	2.5%
	5,509-5,840	2.5%			6,000-6,999	3%
	5,841-6,191	3%			7,000-7,999	4%
	6,192-6,563	3.5%			8,000-8,999	5%
	6,564-6,958	4%			9,000-9,999	6%
	6,959-7,377	4.5%			>10,000	7%
	7,378-7,820	5%				
	7,821-8,291	5.5%				
	8,292-8,789	6%				
	8,790-9,317	6.5%				
	9,318-9,877	7%				
	9,878-10,471	7.5%				
	10,471-11,100	8%				
	11,101-11,767	8.5%				
	11,768-12,474	9%				
	12,475-13,223	9.5%				
	>13,223	10%				
Coverage of students	Universal		Universal		Universal	

Annual Reports prepared by New Zealand Inland Revenue, Ministry of Education, and Ministry of Social Development. (https://www.educationcounts.govt.nz/publications/tertiary_education/annual)

Table 3: Potential ICL designs

i. Given the need to increase borrowing limit to help students cope with rising tuition fees, loan size is set at VND 20 million /year for Schemes A and B (33 percent higher than the current limit and most likely sufficient to cover tuition fee and living costs at non-autonomous public HEIs) and VND 40 million/year for Scheme C, which is roughly sufficient to cover the costs at autonomous public HEIs.
ii. All three schemes require no repayment when a debtor's income is below their respective first repayment threshold. The first threshold is set at the average annual income of 23-years old fresh graduate for Scheme A, 53.7 percent of the minimum annual wage for Scheme B[10], and at the urban minimum wage for Scheme C.
iii. Scheme A, following the Australian design, has a zero real interest rate. In contrast, the New Zealand design features a zero nominal interest rate, which translates to -3.4 percent when applying to Vietnam's context given the average inflation rate during 2013-2018. Scheme C sets the interest rate equal to the government cost of borrowing, i.e. there is no interest subsidy.
iv. None of these schemes provides loan forgiveness. Debtors repay until they pay off in
full or until they permanently stop earning above the first repayment threshold.
v. The government's cost of borrowing is assumed to equal the government's current real five-year bond yield.

Since Scheme C does not follow any existing design, sensitivity to some of its parameters will be tested in Section 4.2.4.

Repayment experience

While TBRL requires fixed repayment amount over a set period of time, under ICL scheme repayment is only required if and when a debtor's income exceeds the first repayment threshold, and the repayment amount is capped by law. Repayment time, as a result, varies across debtors while the repayment burden is either equal to the repayment rate(s) for ICLs that feature gross repayment rates – such as Scheme A – or below the repayment rate(s) for ICLs that feature marginal repayment rates – such as Scheme B and C in this paper. Understanding loan impacts on debtors under ICL

[10] This is the ratio between the repayment threshold and annual minimum wage for adults in New Zealand ($380/week divided by $708/week). Source: https://www.classic.ird.govt.nz/studentloans/working/employed/student-loan-repayments-employed.html; https://www.govt.nz/browse/work/workers-rights/minimum-wage/

systems therefore entails estimating the duration of repayment, which depends on the loan size, the interest rate, and the surcharge.

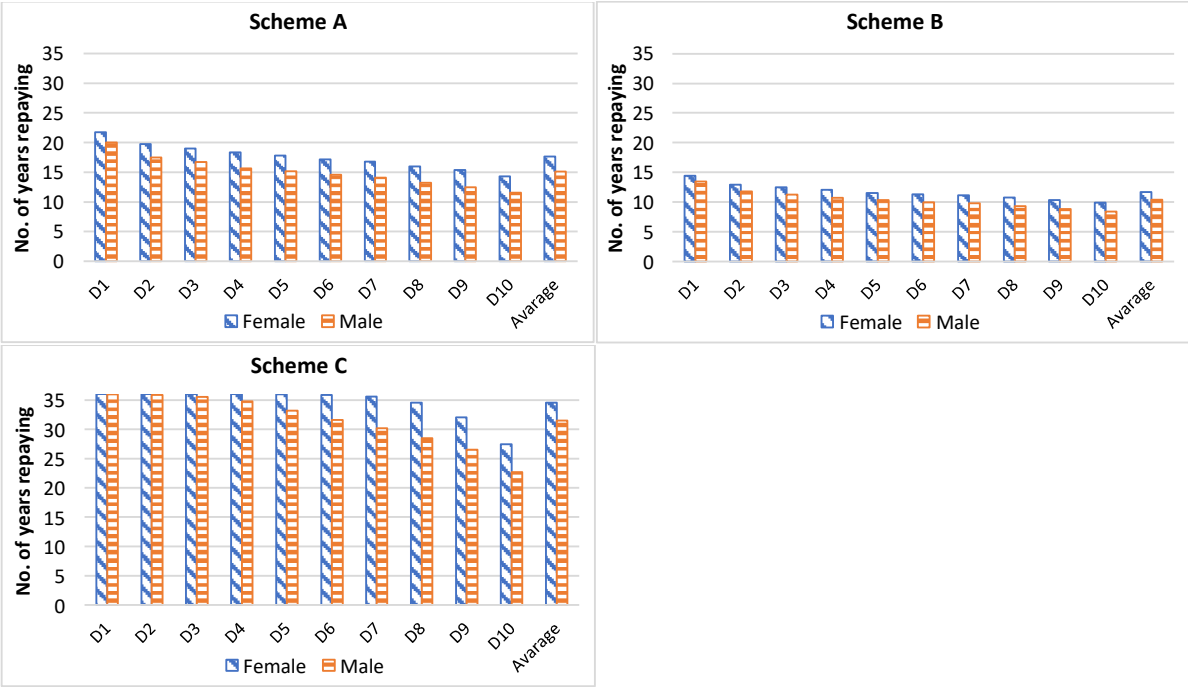

Figure 8: Repayment duration

Note: Debtors are assumed to retire and, thus, stop repaying at age 60.

Figure 8 presents the average number of years that graduates among each lifetime income decile would spend repaying their student debt under each scheme. On average, it takes 15.1 years for males and 17.6 years for females to fully repay their debts under Scheme A. Scheme B, which features no surcharge and a considerable negative real interest rate, unsurprisingly takes the least time to be paid off, only 10.4 years for males and 11.7 years for females. In contrast, Scheme C, although having a lower surcharge and a relatively softer repayment arrangement than Scheme A, takes the longest, 34.5 and 31.5 years for females and males, respectively, due to both the larger loan size and the positive interest rate.

While a direct comparison is not feasible due to differences in loan size and graduate income distribution, it is worth noting that the repayment duration under Scheme A and B appear compatible with their original models in Australia and New Zealand. As of 2017/18, an average Australian debtor needs 9.1 years to repay their debt while a median New Zealand graduate needs 6.8 years. These figures are only moderately smaller than our estimates. The difference is mostly because (i) unlike Scheme A, the Australian system does not include a surcharge, and (ii) the New Zealand system requires 12 percent marginal rate on a borrower's main earnings but 12 percent

gross repayment rate on all secondary earnings, which help speed up repayment as compared to the arrangement in Scheme B.

Repayment duration is generally longer among those who earn less over their working life. The gap is largest under Scheme C; male and female graduates at the bottom lifetime income decile would spend approximately 13.3 and 8.6 more years than those at the top decile, respectively, to pay off their debts. The corresponding figures are 8.5 and 7.4 years under Scheme A and 5 and 4.5 years under Scheme B. This is mostly because the progressive repayment rates, coupled with small incremental income brackets in Scheme A make low-earners pay back faster as their income increases.

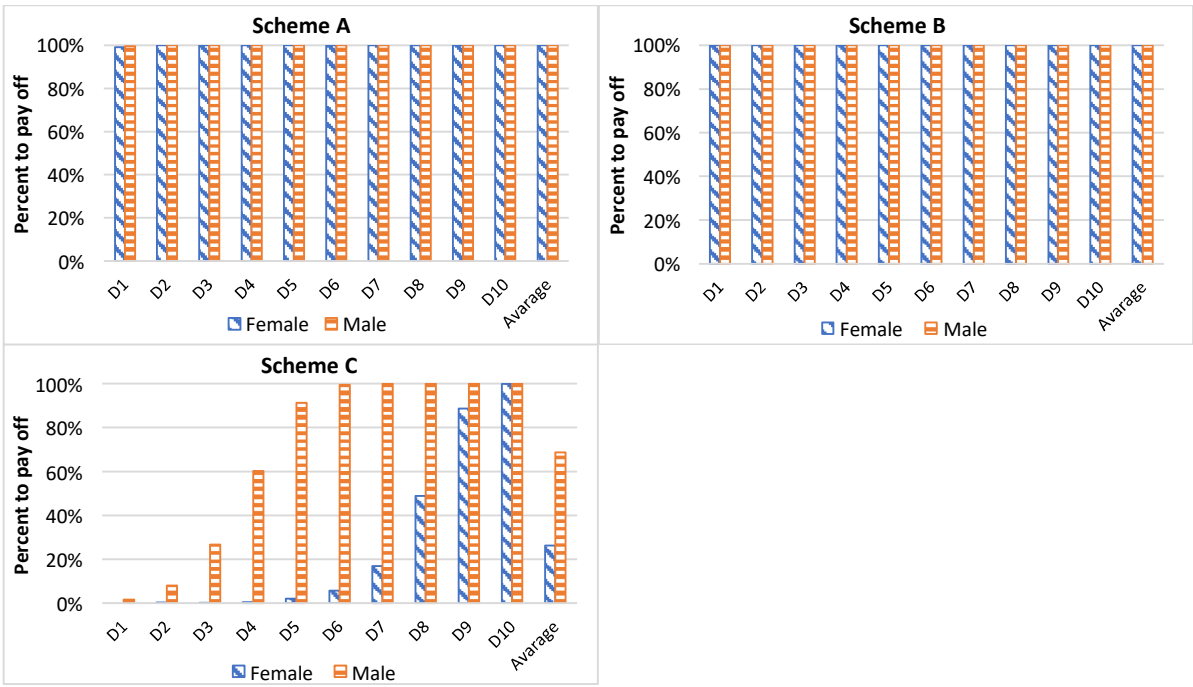

Figure 9: Proportion of debtors repaying in full

Another aspect of repayment performance is the proportion of graduates who would pay back in full. All debtors are projected to fully repay their debts under Scheme A and B, yet only 26 percent of females and 69 percent of males would under Scheme C (Figure 9). Most notably, almost no female at the bottom half of the lifetime income distribution can pay off their debts by the time they retire, neither do 98 percent of males among the poorest decile.

This, however, does not necessarily mean that these debtors pay back less than their borrowed amount. The combination of a surcharge and an interest rate equal the government's cost of borrowing in Scheme C makes those who pay off or even nearly pay off their debt effectively return more than what they received and thus cross-subsidise those who do not. In contrast, the negative interest rate and zero

surcharge in Scheme B means that even fully paid off debts fall short of their original amounts in present value terms. This leads to the notion of government subsidy in the following section.

Government subsidies

From a public financing perspective, two important questions related to student loan performance are how much government needs to subsidise for non-repayment and the difference between the loan's interest rate and the government's cost of borrowing, and how the subsidy is distributed among different groups of debtors. To address these questions, Figure 10 illustrates the government subsidy rates based on lifetime repayments of a cohort of borrowers and highlights the differences across the three schemes. Two key things stand out from this figure.

One, Scheme C turns out to be most progressive in terms of cross-subsidy between high-income and low-income borrowers. In particular, the top 60 percent of males and top 30 percent of females repay more than they borrowed – hence their negative subsidy rates – and effectively compensate for the shortfalls in repayment from those at the lower end of the income distribution. While low earners generally benefit more from government subsidies in all three schemes, the differences across income deciles are much more modest in Scheme A and Scheme B. The differences in subsidy rates between male and female borrowers are also most striking in Scheme C.

Two, despite providing a two-time larger loan size which increases the probability of non-repayment, Scheme C is only the second most expensive. Taking into account the sex ratio among graduates, the overall subsidy rates are estimated to be 5.5 percent, 37.5 percent, and 12.5 percent for Scheme A, B and C, respectively. Scheme B unsurprisingly is the costliest due to its negative interest rate and the absence of a surcharge.

How do these figures compare with subsidy rates of existing ICL schemes? The most relevant reference points for our exercise would be the Australian and New Zealand systems. The subsidy of Scheme B is on par with that of the New Zealand system, which ranged between 40-45 percent during 2014-2018 and notably included non-repayment from overseas debtors, a factor not accounted for in our analysis. In contrast, about 20 percent of Australian student loans are expected to not be repaid (Norton and Cherastidtham 2016, p. 1), much higher than the subsidy rate in Scheme A.

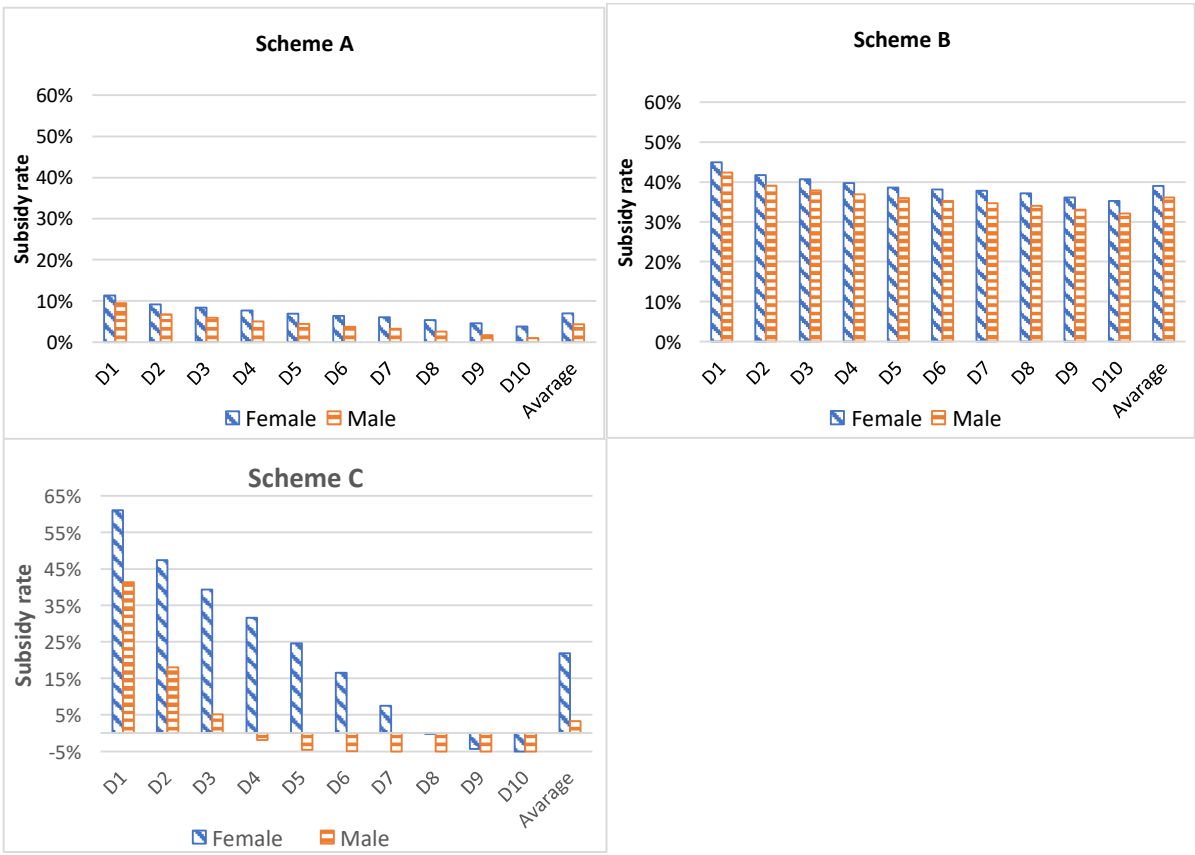

Figure 10: Government subsidy rate

While actual subsidies depend on loan parameters, economic assumptions as well as the number of loan take-ups, this exercise demonstrates that it is feasible to design an ICL for Vietnam that is both soft on the fiscal budget and generous to borrowers. Scheme C in particular allows debtors to fully finance the cost of their degrees in the context of higher tuition charges under Decree 86/2015 yet requires relatively gentle repayment obligations and a modest subsidy from the government. The scheme's repayment rates are in fact lower than those in New Zealand (12 percent), the UK (9 percent) and Australia (maximum 10 percent gross). Another advantage of the scheme is its progressive distribution of government subsidy that lets low-earning borrowers, especially females, benefit from the cross-subsidisation from their high-earning counterparts.

Government recovery rates

Besides the subsidy for a certain cohort of borrowers, another issue of policy interest is how much money the government can recover over time as multiple cohorts of borrowers enter the system. We examine this through the ratio of annual collected debts to annual disbursed loan amount and the ratio of cumulative collected debts to cumulative disbursed loans. These two ratios, which we term "annual recovery rate"

and “cumulative recovery rate”, respectively, can shed light on the cash flows that the government needs to consider as a student loan scheme matures.

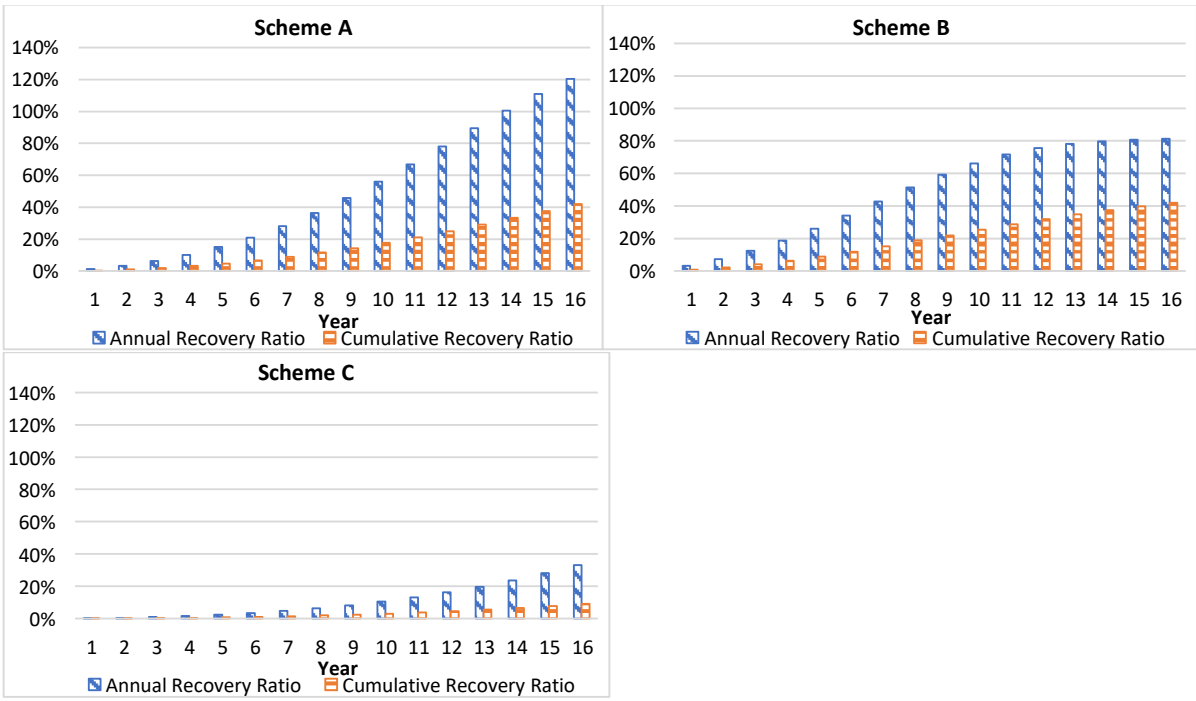

Figure 11: Government recovery ratios

Note: The number of borrowers is assumed to increase by 1% per year while all loan and economic parameters are assumed to remain unchanged over time.

Figure 11 illustrates the annual and cumulative recovery rates for each scheme over 16 years, with year 1 being the year that the first cohort of borrowers graduate and start repaying. With respect to annual recovery rate, Scheme A collects money quickly thanks to its gross repayment rates and thus has a sharply increasing recovery rate. From year 13 onwards, the amount collected annually will be more than sufficient to cover the new loans given out; that is, the system becomes self-sustainable. On the other hand, Scheme B’s annual recovery rate seems to flatten out at about 80 percent around year 12. This is because borrowers under this scheme only need 10-11 years on average to pay back their debts (see Figure 8); from year 12 onwards as borrowers from the first cohort starts to exit the system the number of cohorts remaining in repayment stabilises and the increase in the number of debtors in repayment is mainly driven by the system’s expansion rate, which is set at only 1 percent per year in this exercise. The scheme’s negative interest rate is also a factor contributing to its recovery rate flatting out as a fully repaid debt is smaller than its principle in present value terms. Scheme C, due to its gentle marginal repayment rates, recover outflow money the slowest as debtors take the longest to pay back.

Compared to the annual recovery rate, the cumulative rate is much smaller and increases at a slower pace under all three schemes. By year 16, the government can recover approximately 42 percent what they have lent in Scheme A and B, whereas Scheme C reaches only 9 percent. As a reference point, in Australia the gap between the annual collected amount and outlay widens rapidly over time since both the number of borrowers and loan size have increased significantly (Norton and Cherastidtham 2016, p.10; Norton *et al*. 2018, p. 53). The expansion of the system and the speed of fund recovery are ultimately fiscal issues that the government should consider with respect to their current and expected budget.

It is important to note that 16 years is a relatively short period to fully assess the fiscal implications of a student loan system. Figure 11 provides only a brief illustration of how the schemes are likely to evolve in fiscal terms, given the assumed discount rate and growth in number of borrowers. The expansion of the system, changes in loan parameters as well as economic conditions that affect the graduate labour market can all influence how a loan system might perform. A much longer timeframe is also needed to further understand, for instance, whether and when the government might break even or how much additional funding is expected for each percentage increase in enrolment rate.

Sensitivity analysis

For robustness, this exercise investigates how Scheme C performs in terms of government subsidy, number of years for borrowers to pay off and the proportion of borrowers paying off their debts when surcharge rate varies from 0 percent to 15 percent and when loan size is reduced by half to VND 20 million/year (Table **4**). On the one hand, increasing/decreasing the surcharge while keeping loan size at VND 40 million/year can decrease/increase government subsidy and the proportion of debtors repaying in full considerably. The average repayment duration, however, only changes marginally, by less than half a year for each 5 percentage points change in the surcharge.

On the other hand, given the same repayment arrangement and interest rates, downsizing the loan size significantly reduces government subsidy; the government can even make a profit when putting a surcharge of 5 percent or more on the loan. Notably, the government subsidy is much lower than that under Schemes A and B, which feature the same loan size but non-positive interest rates. The smaller loan also means that the vast majority of borrowers would pay off their debts before retirement.

Loan size (VND '000/ year)	Surcharge	Government subsidy rate			No. years to pay back			Proportion of debtors repaying in full		
		female	male	avg.	female	male	avg.	female	male	avg.
40,000	15%	19.54%	-3.18%	8.05%	34.94	32.37	33.64	19.96%	60.89%	40.65%
	10%	20.61%	-0.03%	10.17%	34.76	31.94	33.33	22.83%	64.86%	44.08%
	5%	21.83%	3.30%	12.46%	34.54	31.48	32.99	26.29%	68.73%	47.75%
	0%	23.24%	6.83%	14.94%	34.26	30.98	32.60	30.32%	72.51%	51.65%
20,000	15%	-9.15%	-13.69%	-11.45%	29.25	25.01	27.11	77.81%	95.00%	86.50%
	10%	-5.20%	-8.93%	-7.09%	28.76	24.55	26.63	80.24%	95.72%	88.07%
	5%	-1.12%	-4.12%	-2.64%	28.24	24.09	26.14	82.94%	96.47%	89.78%
	0%	3.10%	0.71%	1.89%	27.68	23.60	25.62	85.60%	96.95%	91.34%

Table 4: How does Scheme C perform with different loan sizes and surcharges?

This exercise, together with the findings in Section 4.2.1-4.2.3 above, demonstrates that it is feasible to design an ICL scheme for Vietnam that is both revenue-neutral for the government and generous for borrowers. The various parameters of an ICL, namely interest rate, repayment rate, repayment thresholds, surcharge, loan size, and loan forgiveness, make it sufficiently flexible to simultaneously accommodate multiple goals of a student loan system with respect to budget constrain, assistance to borrowers, and progressiveness of government subsidy. Yet as illustrated by the performance of Scheme A and B in comparison with Scheme C, a scheme that works well in one country might not in another. While Scheme A and B closely follow the well-established systems in Australia and New Zealand, respectively, they are likely to create a subsidy that is too heavy for Vietnam's fiscal budget, especially if loan size is considerably higher than VND 20 million/year. In other words, the most suitable loan design for Vietnam in particular and any country in general depends on the government's objectives, budget constrain, as well as the country's specific demographic and labour market characteristics (Chapman and Doan 2019).

Implementation issues

Vietnam has several favourable conditions to implement a universal ICL. One, about 84 percent of graduates below 30 years old work in the formal sector, where employer with-holding of income tax already exists. The marginal cost of having employers with-hold student debt repayment in addition to income tax is likely to be small. Debt collection through employer with-holding of contemporary income not only ensures that debtors are protected against contemporary adverse labour market

outcomes but also maximises collection efficiency (Barr *et al.* 2019). Two, tuition fee cap has traditionally been an integral part of the higher education landscape and higher education institutions are mostly public, which helps mitigate the risk of ballooning debts when higher education institutions take advantage of a generous loan scheme to raise fees. Three, the unemployment rate among young graduates is relatively low, i.e. most graduates are likely to start repaying soon after graduation. However, some implementation issues are worth noting. First, Vietnam's weak public administration, especially the inefficient and bureaucratic collaboration and information sharing among different governmental agencies, could make the management and collection of student debts difficult. In countries where ICL has been well-established such as Australian and New Zealand, the national tax office is in charge of collecting repayments from debtors who are self-employed or work in the informal sector. Vietnam's General Tax Office, however, is not involved in the current loan scheme. The scheme is managed by the Bank for Social Policies, a state-owned bank in charge of various social protection policies. While the bank determines which applicants receive loans, eligibility verification and application processes are done through a complex web of local authorities, including community saving groups, communal People's Committee, and the higher education institution where the potential student borrower is or is going to be enrolled. If Vietnam adopts an ICL scheme, it is unclear which governmental bodies will be involved and how they will collaborate.

Another issue is the possibility of under-reported income. A recent research by Duc and Hai (2019) reports that in the formal sector employers under-declare their staff wages in order to pay less social insurance contributions whereas in the public sector low wages drive workers to seek extra income, which is often misreported (p. 2). Using data from the VHLSS 2010-2016, they estimate that wage earnings are under-reported by 40 percent in the public sector, and 33-38 percent among private firms. While this paper uses income data from the LFS, it is unclear to what extent (if any) the LFS better reflects true labour income than the VHLSS. This means that our simulation might overestimate the ICL repayment time and government subsidies. A more serious implication of this issue is that, if income under-reporting exists not only in survey data but also in employers' payroll records, the accuracy and equitability of debt collection through employer with-holding are undermined. Without further information, however, we cannot conclude the extent (if any) this issue might influence the performance of an ICL in Vietnam.

Moreover, the lack of a quality control mechanism has been a key factor underlying the mediocre quality of Vietnam's higher education institutions. It will be even more problematic when a universal loan system expands access and lead to increased enrolments. Caution is needed to ensure that debt-financing students receive a quality degree.

Conclusion

This paper, for the first time, reports the feasibility of alternative higher education loan schemes for Vietnam. This is a highly pertinent exercise for Vietnam's higher education financing policy for two main reasons. First, with a rapidly aging population, the country might get old before getting rich. Human capital deepening is therefore critical for Vietnam to graduate from the current growth model that relies on comparatively cheap labour and labour-intensive manufacturing. Second, the government has recently shifted the cost of higher education further towards students, leading to substantially higher tuition fees while financial assistance to disadvantaged students remains highly limited. This not only raises grave concerns about access and equity but can also impede the country's effort to expand the supply of skilled labour and modernise the economy. The solution to these challenges, this paper argues, is a well-designed student loan system that simultaneously funds the expansion and improvement of higher education institutions and helps credit-constrained students.

The paper first shows that Vietnam's current loan system not only inadequately covers credit-constrained students in the context of rising tuition fees but more importantly can create excessive repayment burden to debtors, especially if they don't receive financial support from their family. The paper then analyses how three alternative ICL schemes might perform with respect to government subsidies and debtor's repayment experience and demonstrates that it is feasible to design an affordable and equitable ICL that provides sufficient resources for students to finance their degrees yet does not penalise low-earning debtors. These findings fit squarely into to the still-in-its-infancy discussion on the potential of adopting ICL in Vietnam in policy fora.

As Vietnam's experience is related to a wide range of middle-income Asian countries that have been struggled to reach high-income status, this paper also contributes to a growing literature that studies student loan reform as a key tool to invest in human capital accumulation and help developing countries modernise their economies. On the one hand, the paper echoes previous findings from similar studies conducted for Brazil, Japan, China, Ireland and Thailand that a well-designed ICL could help expand higher education access and improve access equity in a cost-effective manner. On the other hand, this paper improves upon the previous works on China, Ireland and Thailand in terms of econometric method by incorporating income dynamics into the projection of graduate lifetime income. It also differs from the studies on Japan, Brazil and US by exploring the performance of alternative ICL designs in the context of a lower middle-income country, where current level of graduate income is still low but labour productivity growth is strong.

Two caveats should be noted, however. First, the estimation of government subsidies and repayment experience is sensitive to both the patterns of graduate income dynamics and the macroeconomic assumptions. This study uses income

data of the period from 2011 until 2016 and adopts the average labour productivity growth during 2000-2013; the income dynamics and productivity growth from this period might not reflect what will happen to future graduates, especially if the supply of graduates increases. Also, an increase/decrease in the government's cost of borrowing will increase/decrease the costs to taxpayers for future graduates, all else equal.

Second, there is evidence of under-reported income and it has important implications for both our estimation and the implementation of an ICL in Vietnam. If income data from the LFS, from which we project graduate lifetime income, are underreported, our estimated repayment time and government subsidies are understated. More importantly, collecting repayments through employer with-holding of labour income could recoup less and at a slower pace at the expense of taxpayer's money if employers' payroll records do not reflect the true earnings of their workers. However, without further information about income under-declaration among graduate workers, it is difficult to assess the extent (if any) of this issue.

Since the current loan scheme is tiny and inefficient, converting it into a universal ICL is likely to lead to efficiency and equity gain. Yet further research is needed to fine-tune the ICL design proposed in this paper. The design needs to take into account actual enrolment numbers and other costs associated with implementing and administering a new loan scheme. Nevertheless, what this paper makes clear is that an ICL could be designed for Vietnam to not only finance additional university places and thus increase access, but also do so in a fiscally sustainable and equitable way.

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Appendix

Appendix A: Raw and age-smoothed age-income profiles

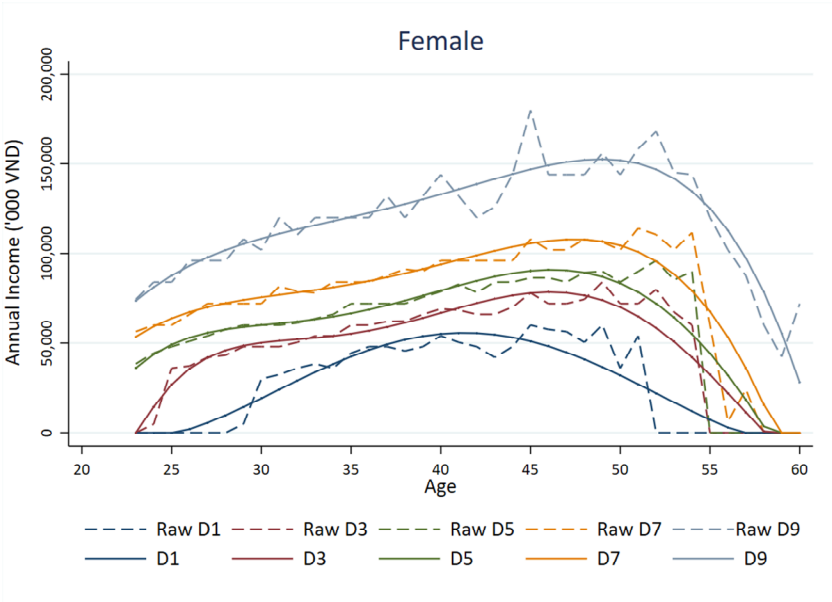


Figure A1: Raw and age-smoothed age-income profiles of female graduates

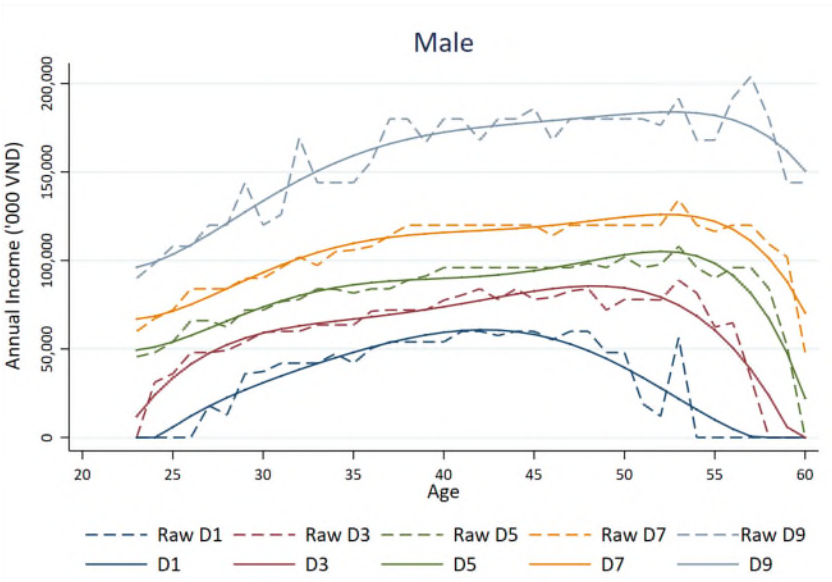


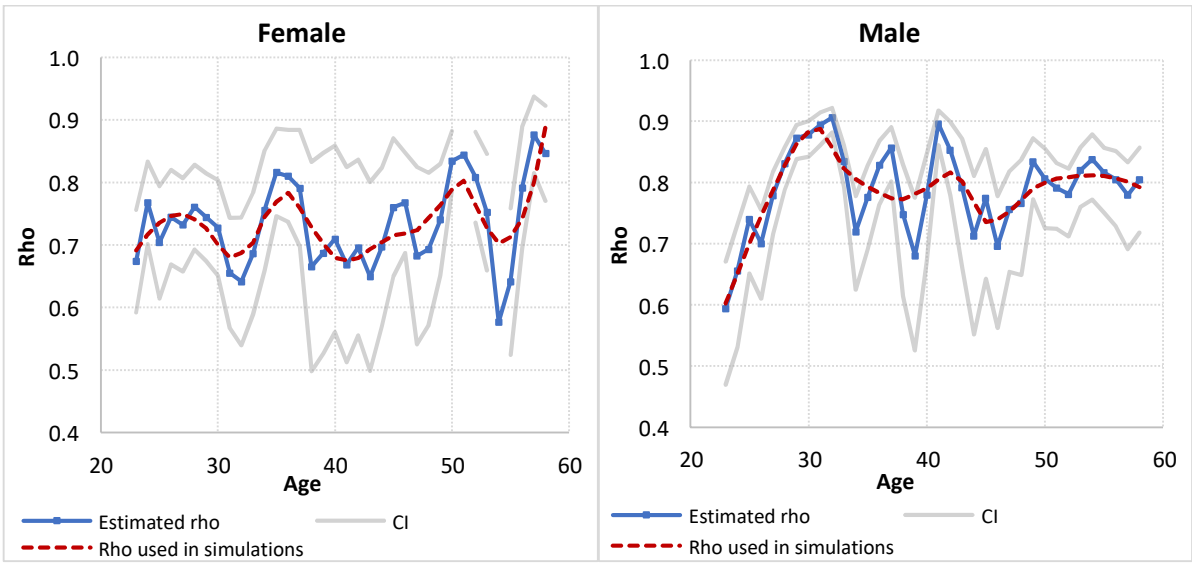
Figure A2: Raw and age-smoothed age-income profiles of male graduates

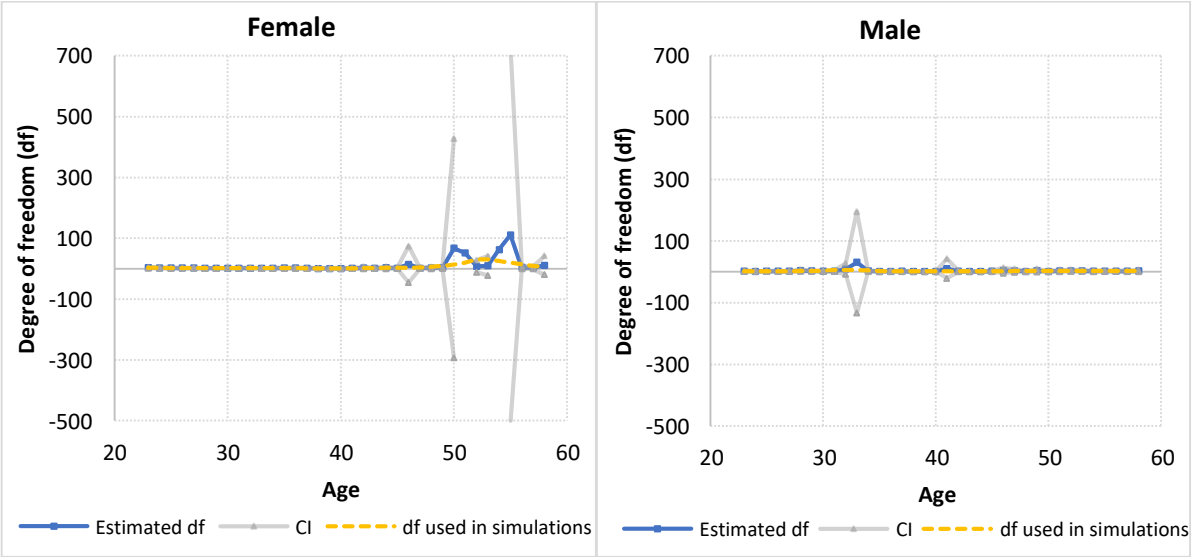
Appendix B: Transition matrix of graduate income quintiles

Panel A. Female						Panel B. Male					
Quintile	Q1	Q2	Q3	Q4	Q5	**Quintile**	Q1	Q2	Q3	Q4	Q5
Q1	**56.35**	22.15	11.24	5.86	4.40	Q1	**63.17**	20.84	9.21	3.88	2.91
Q2	25.09	**33.10**	27.05	11.21	3.56	Q2	25.63	**40.32**	20.79	10.75	2.51
Q3	9.35	22.52	**35.69**	24.62	7.82	Q3	7.87	23.03	**38.39**	23.99	6.72
Q4	9.02	13.08	21.18	**37.38**	19.34	Q4	3.17	8.19	28.31	**40.60**	19.74
Q5	4.47	4.28	9.50	24.58	**57.17**	Q5	3.33	3.33	9.30	27.19	**56.84**

Appendix C: Estimated and age-smoothed rho and degree of freedom of t-Copula

Figures display the estimated rho (ρ) and degree of freedom (ν), their 95% confidence interval (CI) and their age-smoothed estimates at each age.




Female
Degree of freedom (df)
700
500
300
100
-100
-300
-500
20
30
40
50
60
Age
Estimated df
CI
df used in simulations
Male
Degree of freedom (df)
700
500
300
100
-100
-300
-500
20
30
40
50
60
Age
Estimated df
CI
df used in simulations