

The Impact of Employer Education Assistance on Enrollment

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Abstract

Policymakers incentivized higher education enrollment through the creation of Section 127 of the United States Internal Revenue Code. This policy provides a tax deduction to employers that provide financial assistance for employee education. This paper finds that before and after extensive correction, the policy fails to increase enrollment meaningfully. Evidence from 1992 through 2017 indicates adverse linear and total effects of interest. H-1B policy is explored as a correction variable and emerges as a comparatively preferred policy tool. Results are validated using vector autoregression (VAR), dynamic ordinary least squares (DOLS), and instrumental variable (IV) analysis.

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1. Introduction

The passage of Public Law 95-600 in 1978 created Section 127[1]. Section 127 provides for a limited employer tax deduction for the transfer of money to an employee for educational purposes. This paper tests the hypothesis that the effect of Section 127 employer assistance on total university enrollment is positive. Results show that employer assistance has a positive marginal effect on enrollment and negative linear and total effects. Evidence indicates that H-1B visa policy is a comparatively effective policy instrument for enrollment, national student loan debt, and the price of education.

Total enrollment is one of a few policy concerns related to Section 127. The paper concludes by asking whether the results observed represent policy success. In summary, how do Section 127 results over time relate to its policy goals? This paper finds that Section 127 has achieved partial success, but several changes are advisable.

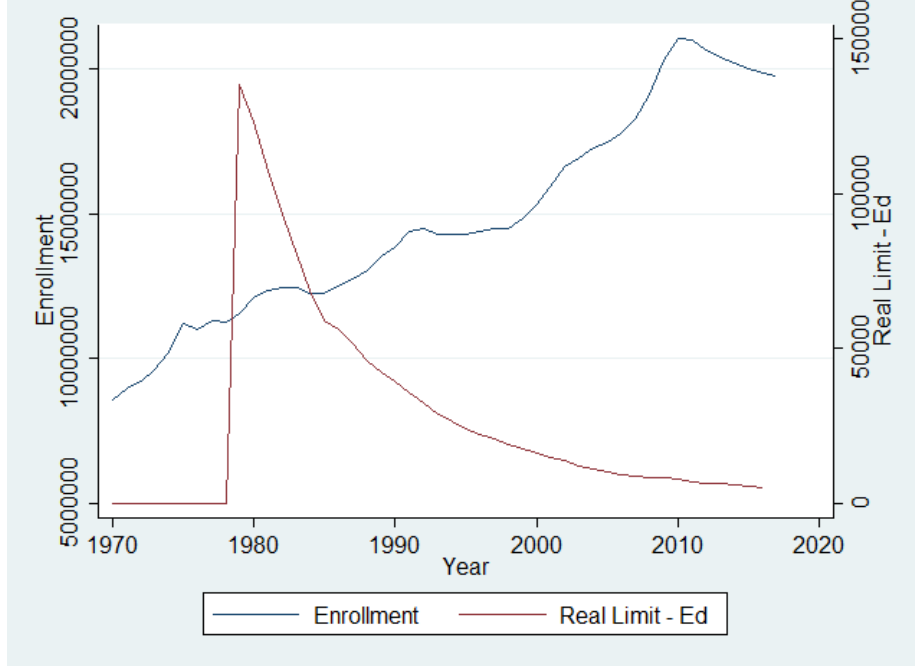
Figure 1 illustrates university enrollment over time and the real maximum deductible amount for Section 127 educational assistance. This paper hypothesizes that the apparent inverse relation is a superficial result of variable omission. Analysis in this paper controls extensively for dynamic policy and economic variation. The use of multiple specifications ensures the robustness of findings. In one specification, vector autoregression (VAR) provides evidence on utility as a policy instrument.

2. Methodology

This paper broadly explores Section 127 effects in comparison to its policy goals. The focus of this broad conversation is the identification of the policy effect on total enrollment. This identification proceeds from statistical analysis across multiple specifications. This paper operationalizes total enrollment as a representation of one of the original Section 127 policy goals.

The Society for Human Resource Management (SHRM) [2] identifies three original policy goals for the passage of Section 127. The third policy goal is

Figure 1: Enrollment and Real Assistance Over Time



30 to incentivize upward mobility by providing funds for higher education. As a result, this paper takes total enrollment as the dependent variable.

Specifications begin with an ordinary least squares (OLS) investigation. Finding significant time effects justifies and motivates further analysis. Dynamic ordinary least squares replicates the importance of time effects, and also
 35 addresses concerns on potential autocorrelation. Finally, a vector autoregression indicates that certain policy changes are candidate policy instruments.

3. Empirical Model

This paper takes multiple steps to ensure robustness and analytical completeness. The final results are consistent across three empirical specifications.
 40 In addition to the variable of interest, this paper tests two other left-hand variables. Testing these two secondary dependent variables of interest improves

confidence in the theoretical and applied soundness of the conclusion.

Total postsecondary enrollment in the United States is the dependent variable. The Section 127 policy effect is the right-hand parameter of interest in the first two specifications. Equation 1 is the first specification of interest. This
45 model is an ordinary least squares model. Here, α is a $1 \times k$ vector of coefficients, and V is a $k \times 1$ vector of annually observed independent variables.

$$Y_t = \alpha V_t + u_t \quad (1)$$

Policy variables exist for federal lending policy, veteran education benefits, and H-1 Visa policy. Two additional non-policy variables include time, in years,
50 and the real price of university tuition plus mandatory fees.

Equation 2a describes the next specification. This model follows the Anderson–Hsiao pattern[3] with the lagged variable of interest as an instrument. This specification investigates concerns of potential endogeneity in the dependent variable. It is both an instrumental variable model and also a dynamic
55 ordinary least squares (DOLS) model.

$$\Delta Y_t = \beta W_t + B z_t + e_t \quad (2a)$$

$$z_t = \delta W_t + D Y_{t-2} + g_t \quad (2b)$$

Here, β is a $1 \times l$ vector of coefficients, and W is an $l \times 1$ vector of annually observed independent variables. z is the instrument, and it is a projection of lagged enrollment derived from twice-lagged enrollment. Equation 2b explicitly
60 derives z .

l is a transformation of k from Equation 1. l contains five variations of each variable in k . The first variation is the non-transformed value. The other variations include the first and second lags and differences for each variable in k .

65 The third specification is a vector autoregression (VAR) model. Six related models follow the general reduced form described in Equation 3c. This first

model following this functional form is a two-variable case. This first model is similar to the previous non-VAR specifications because it identifies the effect of real employer assistance on total enrollment. A second model follows the same
70 form, but the independent variable is H-1B visa issuance, instead of Section 127 assistance.

$$v_t = \alpha_0 + \alpha_1 v_{t-1} + \alpha_2 v_{t-2} + \dots + \alpha_i v_{t-i} + u_t \quad (3a)$$

$$V_t = \alpha_0 + \alpha_1 v_{1,t-1} + \alpha_2 v_{2,t-1} + \dots + \alpha_{ik-1} v_{k-1,t-i} + \alpha_{ik} v_{k,t-i} + u_t \quad (3b)$$

$$Y_t = \sigma_k V_{kt} + e_t \quad (3c)$$

Equation 3a is a univariate autoregression. Dependent and independent
75 variables are uniformly represented by v_t . An ordinary least squares function of i lags explains the current-period value of the variable in the univariate regression. Equation 3b extends this operation to k variables. Notice that V_t is not a collection of univariate v_t . Instead, it is a $k * k$ vector, a constant, and an error term.

80 Equation 3c obtains V_t as specified in Equation 3a for all variables in k , then fits an ordinary least squares model across V_{kt} to explain the current-period dependent variable, Y_t . Section 127 effects turn out to be insignificant in the specification described by Equation 3c, but H-1B effects are significant. As a result, all four remaining VAR equations use H-1B issuance as the independent
85 variable.

Two of the four remaining models are three-variable extensions of the prior specification. These two models extend Equation 3c by adding a second stage response. In the first case, the second-order response is federal student loan debt. In the second case, the second-order response is the price of higher education.
90 David Schenk suggests Cholesky decomposition as a method of generating an

ordered impulse-response function from a VAR[4]. Equations 4a and 4b describe Cholesky identification.

$$e_t = Bu_t \quad (4a)$$

$$\Sigma = E(e_te_t') = E(Bu_tu_t'B') = BE(u_tu_t')B' = BB' \quad (4b)$$

The left-hand error term in Equation 4a, e_t , is the same as in Equation 3c.
 95 The right-hand of Equation 4a defines B , which is the coefficient matrix for u_t . Structural, or uncorrelated, errors are defined as u_t . Endogenous error in B allows us to estimate the effects of arbitrary innovation in some variable in V_k .

The reduced form BB' in Equation 4b matches many matrices. There does exist a unique lower-triangle matrix that satisfies the equality statement with Σ ,
 100 the covariance matrix of the errors. Selecting the lower-triangle represents analyst stipulation of the order in which effects are realized. The order imposed is called a Cholesky ordering. This paper selects theoretically-grounded Cholesky orderings.

The last two models in the six-model VAR family are also simple two-factor
 105 VAR models. These models test the hypothesis that enrollment effects are extraneous to the effects of H-1B policy on student loans and the price of higher education. The form of these models follows the specification in Equation 3c, but the independent and response variables are different. H-1B issuance is the independent variable. The response variable is federal student loan debt in one
 110 case. The price of higher education is the response variable in the other case.

4. Description of Data

Models in this paper use a subset of nine high-level variables. Enrollment figures for all degree-granting postsecondary institutions in the United States are provided by the National Center for Education Statistics (NCES)[5]. Enrollment
 115 figures are for the fall semester of the school year.

For the same group of institutions, NCES elsewhere provides data about average tuition and required fees[6]. This study uses price information for full-time undergraduate students. Prices do not include the cost of room and board. Cost information exists through the year 2016 Cost information reflects real
120 prices. 2016 is the base year for Consumer Price Index (CPI) adjustment.

Section 127 took effect on January 1, 1979, with a nominal assistance limit of 5,000 dollars[1]. In October 1986, Pub. L. 99-514 increased the nominal assistance limit to 5,250 dollars[7]. Nominal limits are adjusted for education-specific inflation using NCES price data. The real employer assistance limit is
125 the primary explanatory variable of interest to this study.

Section 127 was renewed several times over the years. A dummy variable exists for a considerable change realized in 2013. In that year, the employer assistance deduction became permanent. Personal Consumption Expenditures (PCE) data is a measure of inflation provided by the U.S. Bureau of Economic
130 Analysis (BEA)[8]. PCE is a fourth independent variable.

Stafford loan data is another critical high-level component of the analysis. Stafford loan limits impact the supply of loanable funds, which indirectly modifies demand for education. Stafford data also broadly proxies non-military federal student aid policy. Stafford loans technically decompose into two lower-
135 level factors. The first is the nominal loan limit for undergraduates. The second variable is a dummy variable. The dummy variable indicates whether the undergraduate loan limit is the combined limit for undergraduate and graduate loans. A policy change in 1993 grouped these limits. FinAid provides the Stafford loan data used in this study[9].

140 Visa policy is the sixth high-level variable. The number of H-1B visas issued each year is an essential variable in this study. The Immigration Act of 1990 decomposed the existing H-1 visa into distinct H-1A and H-1B categories. Later legislation established the H-1B1, H-1C, and many other visa classifications, but these are mostly inapplicable to the present research. The H-1B visa is most
145 relevant for this study because it relates explicitly to the undergraduate degree. The Immigration Act of 1990 makes available the H-1B classification for spe-

cialized workers, or workers in a specialty occupation. That legislation formally defines a specialty occupation as "an occupation that requires...attainment of a bachelor's or higher degree..." The period of analysis for this study is constrained to begin with the advent of H-1B data in 1990. As earlier mentioned,
150 tuition data constraints the end of the analysis to 2016.

H-1 visas are a subgroup of nonimmigrant visas. The Bureau of Consular Affairs provides nonimmigrant visa award data by classification from 1987 to 2019[10]. This paper exclusively uses the most relevant H-1B visa award numbers, but reanalysis with other visa classifications could yield statistically significant findings. The prior H-1 visa was also a merit worker visa, but it had no formal definition of merit. It is plausible that the college-educated effect informally existed before the 1990 legislation. One might also find small but significant effects by looking into visas outside the H-1 family. Besides the number of actual visa awards, an analyst could look for visa cap effects or visa policy state effects. For example, the Pew Research Center notes that the American Competitiveness in the 21st Century Act of 2000 exempts certain entities from the H-1B cap[11].
160

Actual federal loans stand in contrast to loan limits, which are represented by the Stafford loan limit variable. Loan limits are a policy choice, but after
165 correcting for loan limits, the actual amount of loans made primarily represents a demand effect. As such, we would not want to correct for actual loans. That would wipe out the effect of interest, which is the demand effect attributable to various policies, and Section 127 employer educational assistance in particular.

Loan data generates results as a left-hand variable of secondary interest, rather than as an independent variable. The variable I use in this regard is total federal undergraduate loans. College Board provides loan data. College Board also gives the additional context in a report which is related to the loan data[12]. The additional context suggests that an analysis that decomposes
170 federal loans by type could yield preferred statistical results[13].

The final subset of data describes veteran education benefits policy. Each year in the data set is associated with some veteran education policy. Veteran

policy effects are a high-level variable which technically decompose into seven dummy variables. A series of seven dummy variables capture veteran education policy effects. The seven variables cover the period from 1944 to 2021. The
180 Servicemen’s Readjustment Act of 1944 is also called the G.I. Bill. The original bill expired in 1956[14]. The period from 1944 to 1956 is positively associated with the first dummy variable.

The Veterans Educational Assistance Program (VEAP) passed in 1981[15].
185 The third period of interest ends in 1984 with the enactment of the Montgomery GI Bill[16]. The fourth period of interest ends in 2009 with the Post-9/11 GI Bill. Finally, many benefits from the Forever GI Bill became effective in 2018, with additional provisions taking effect in 2020 and 2022[17].

Because of time sample constraints on other variables, there is only a single
190 variation in veteran education benefits during the period of analysis. This is the enactment of the Post-9/11 GI Bill in 2009.

Recent changes in veteran education benefits and in Section 127 represent critical caveats for any attempt at forecasting outside of the period of study. As mentioned, the Forever GI Bill lays out several important changes in veteran
195 benefits in the years to come. Under the CARES Act, Section 127 was amended to provide a new benefit on a temporary basis[18]. The new benefit is that employers may assist employees in paying down existing student loan debt, rather than only paying for new expenses, in a tax deductible way. Under current law, the CARES Act changes to employer assistance will apply only
200 during the year 2020.

5. Results

5.1. Multiple Regression Results

The prior description of data notes seven independent variables and two dependent variables. Total university enrollment is the primary dependent variable. Initial regression analysis involves ordinary least squares regression of all
205

Table 1: Table of Multiple Regression on Enrollment, Selected Variables

	1	2	3	4
H-1B ²	9.924e-04 (2.357e-03)	1.618e-04+ (8.175e-05)	1.184e-03 (7.354e-04)	2.518e-05+ (1.303e-05)
PCE ²	4.438e-01 (9.256e-01)	-1.235e-01** (2.000e-02)	-2.058e-02 (7.352e-01)	-6.054e-02* (2.128e-02)
Real Assistance ²	-2.391e-01 (3.010e-01)	9.833e-03* (3.034e-03)	1.437e-02 (4.319e-02)	1.822e-05 (1.149e-05)
Section 127 is Temporary	1.193e+06++ (4.728e+05)	1.347e+06** (3.003e+05)	-6.446e+04 (3.612e+05)	
Year	1.504e+06* (3.157e+05)	1.239e+06** (1.488e+05)	-5.346e+05+ (1.937e+05)	
R-sqr	0.9991	0.9943	0.9907	0.5618
N	27	27	27	44

Standard errors in parentheses

+ $p < 0.10$, ++ $p < 0.05$, * $p < .01$, ** $p < .001$

seven independent variables on the primary dependent variable, plus a variable for time.

Results for the initial regression model are described as Model 1 within Table 1. This table presents selected variables, where selected variables are significant in at least two specifications. Section 127, inflation, and time effects were the most important variables in Model 1 ($p \leq 0.000$). Linear and nonlinear employer assistance effects were significant. A dummy variable which represented whether the employer deduction was temporary or permanent was also significant.

Linear and nonlinear visa policy effects were also highly significant ($0.001 \leq p \leq 0.05$). Tuition and the interaction between Section 127 and visa policy were notably insignificant. Veteran education benefits and Stafford variables were also insignificant.

Model 2 is obtained by removing insignificant variables from Model 1. The

importance of time in this analysis motivates further analysis using specifications
220 that are explicitly dynamic.

5.2. *Dynamic Ordinary Least Squares Results*

Models 3 and 4 from Table 1 are dynamic ordinary least squares (DOLS)
models. These models are specially created to address concerns about poten-
tial autocorrelation using an Anderson-Hsiao adjustment[3]. DOLS models also
225 benefit marginal analysis by decomposing within-period and between-period
marginal effects. Model 3 is generated by applying an Anderson-Hsiao adjust-
ment to Model 2. In addition, first and second lags and differences were checked
for each significant variable in Model 2. Model 4 is the result of trimming in-
significant variables from Model 3.

230 The Anderson-Hsiao adjustment involves three changes that allow an ana-
lyst to address actual or potential autocorrelation in the dependent variable.
The first step is to replace the dependent variable with its first difference. The
second change is a refinement in specification. Models 3 and 4 are a special case
of DOLS multiple regression because they are also instrumental variable models.
235 The third step in the Anderson-Hsiao adjustment is to pick a particular instru-
mental variable. This particular instrument is often called the Anderson-Hsiao
estimator. The Anderson-Hsiao estimator is the twice lagged first difference of
the dependent variable.

Model 4 is the preferred least squares model.

240 The preferred dynamic OLS model obtains an adjusted r-squared of about
0.85. In contrast, the simple adjustment to the preferred multiple regression
obtains an adjusted r-squared of about 0.26. A surprising result is that the
Anderson-Hsiao estimator is insignificant across various specifications, including
the preferred DOLS model ($p = 0.51$). Time effects are independently significant
245 in the model. These results indicate the absence of autocorrelation. Instead,
time efficiently proxies unobserved independent effects.

While the Anderson-Hsiao estimator is insignificant, dropping that variable
and running an ordinary regression reduces adjusted r-squared to 0.82, but all

independent factors retain significance. This demonstrates comparative model
 250 robustness over the preferred multiple regression. For this reason, the preferred
 DOLS model, with or without instrumentation, is preferred to the preferred
 multiple regression identified as model 4 in Table 1.

Lagged employer assistance effects are insignificant when explaining the first
 difference in total enrollment. The first and second differences are significant.
 255 The current period linear and marginal effects are also significant. The first
 difference and the current period marginal effects are both significant and pos-
 itively signed. This indicates that raising assistance within-period and between
 periods are both expected to boost enrollment at the margin. Both marginal
 effects follow an Inada-like pattern, where the marginal effect is decreasingly
 260 positive. The linear effect on employer assistance is significant and negative.

Model 6, the preferred model, is fit to the years 1992 through 2017. The
 total effect of employer assistance over that period is now calculated using that
 model. The average values for the relevant independent variables over this
 period include an average real assistance limit of 13942.22, an average squared
 265 assistance limit of 2.56×10^8 , an average first difference in assistance of -1228.18,
 and an average second difference of 122.87. Based on these values, the total
 effect of employer assistance over the model period is a decrease in enrollment
 by about 3.34 million¹. Suppose a steady-state, where Section 127 assistance has
 been constant for more than three periods. In this situation, a \$1,000 increase
 270 over the next period would result in a value of \$1,000 for the first and second
 differences. In this situation, the effect of a dynamic \$1,000 real increase to
 employer assistance would be to increase enrollment by about 7.45 million².

First-difference, lagged, and current H-1B visa effects are all significant,
 but linear visa effects are not significant. DOLS specification reveals significant

¹The total effect is the rounded result of solving $X = -220.1953 * 13942.22 + (2.56 * 10^8) * .0054062 + 1314.489 * -1228.18 - 355.0654 * 122.87$.

²The period-over-period effect from a steady-state is computed as $X = -220.1953 * 1000 + .0054062 * 1000 * 1000 + 1314.489 * 1000 - 355.0654 * 1000$.

275 lagged marginal effects and positive lagged cubic effects. The lagged linear effect is isomorphic to the first difference in this specification, and the first difference is positive. The total lagged effect indicates that as lagged period visa count increases, the expected change in current period visa issuance is both positive and eventually increasingly positive.

280 Other than lagged effects, dynamic visa effects are consistent with an insightful refinement of visa effects identified under multiple regression analysis. For example, an insignificant positive quadratic effect is identified in the preferred ordinary multiple regression. In the preferred DOLS, a positive marginal effect is identified with significance. A negative first difference is also identified with
285 significance. It makes sense that forcing these related and opposing marginal effects into a single variable would lead to insignificance in a non-dynamic specification.

Using a dynamic specification, we can see that marginal effects within and between periods are stable, but they move in different directions. Moreover,
290 both of these marginal effects have an attenuating higher-order counterpart. The positive static marginal effect is attenuated by a negative cubic effect. The negative dynamic static marginal effect is attenuated by a positive and significant second-difference coefficient.

It is important to note that DOLS models explain a slightly smaller period
295 of analysis because of the use of lagged variables. While the preferred multiple regression covers 27 annual samples from 1990 to 2016, the preferred DOLS model obtains a sample size of 25 over the period from 1992 to 2016.

In summary, DOLS analysis demonstrates non-robustness in the preferred non-dynamic model, then provides a preferred alternative model. This paper
300 fails to uncover evidence of autocorrelation.

5.3. Vector Autoregression Results

Vector autoregression (VAR) improves on DOLS specifically for the purpose of identifying policy instruments and effects over many periods. The difference and lag effects of the first and second orders were arbitrarily selected DOLS

305 analysis. In contrast, VAR lag selection techniques involve non-arbitrary selection criteria.

Employer assistance, visa, and time effects are the only factors in the preferred dynamic model. Prior analysis ruled out the significance of an interaction variable between visa and employer assistance effects. As a result, the two initial
310 VAR models are both simple, two-variable models.

For the employer assistance model, an extended sample of 43 observations over the period from 1974 to 2016 is used. For the H-1B model, 24 samples over the period from 1994 to 2017 are used. Ivanov and Kilian find that the Schwarz Information Criterion, also called Schwarz's Bayesian information criteria (SBIC), is the most accurate selection criterion for sample sizes less than
315 120[19].

Because this analysis uses fewer than 120 samples, the selection is determined by SBIC. In addition to SBIC, unanimous agreement on lag selection for both models is achieved using the likelihood ratio (LR), the final prediction error
320 (FPE), Akaike Information Criterion (AIC), and Hannan-Quinn Information Criterion (HQIC). For both models, the optimal lag length is identified at two periods. The p-value for the optimal lag was less than 0.001 for both models.

VAR results for employer assistance are directionally consistent with prior analysis. A positive shock to employer assistance is associated with a downward parabola curve response. The response, however, is not significant for any
325 period, even when using a 60 percent confidence interval.

VAR results for an H-1B policy impulse are significant. A positive shock to H-1B issuance is also associated with a downward parabolic response. The H-1B policy effect is insignificant for the first two periods, but it reaches a significant
330 positive effect in the third period. The positive effect plateaus in the seventh period, then it reverses and reaches permanent insignificance in the eleventh period.

Increased enrollment reflects an increase in demand which is associated with

increased tuition and debt both theoretically and in the present data³. From
 335 a policy perspective, increasing enrollment may not be desirable. Higher edu-
 cation has a great return from an individual perspective, but there are several
 concerns from a social perspective. Examples include concerns about grade infla-
 tion, credential inflation, experience inflation, and the social return to education
 spending abound. For example, Forbes magazine recently pointed out that the
 340 price of college is increasing almost eight times faster than wages[20]. Edvisors
 notes that the average tuition inflation rate is double the average CPI-U[21].
 Many in the media consider the size of federal student loan debt to be a crisis.
 Because H-1B policy is an enrollment instrument, and enrollment is directly re-
 lated to loans and real tuition, further analysis investigates a downstream effect
 345 of H-1B policy on loans or real tuition.

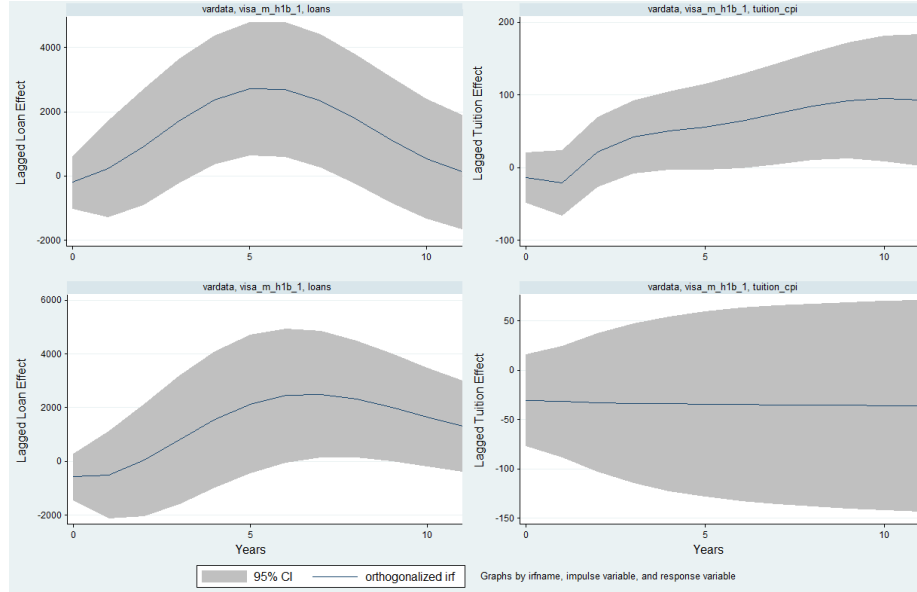
A short regression of total loans, CPI-adjusted tuition, and an interaction
 variable on total enrollment identifies a positive but insignificant ($p > 0.2$) in-
 teraction between tuition and loans. A more sophisticated analysis might prove
 that the interaction does exist, but even supposing significance, the correct
 350 Cholesky ordering is non-obvious. Based on this information, further analysis
 scopes loans and tuition to separate models.

Figure 2 is a graphical representation of the VAR model results. The top
 row contains three-variable models of interest. In these models, an H-1B im-
 pulse generates a first-order enrollment response. The bottom row contains
 355 two-variable specifications that omit the intermediary enrollment response. On
 the left are the loan models, and on the right are the tuition models.

The figure makes the three-variable model preference clear for tuition, but
 some model statistics make the case stronger with respect to the loan models. In
 the two-variable loan VAR, the r-squared for the visa variable is less than 0.89,

³A simple regression of total enrollment on total federal loans yields a positive coefficient
 with a p-value less than 0.001 and an adjusted r-squared of 0.973. A simple regression of total
 enrollment on CPI-adjusted real tuition yields a positive coefficient with a p-value less than
 0.001 and an adjusted r-squared of 0.915.

Figure 2: H-1B VAR Results



and the r-squared for the loan variable is less than 0.988. In the three-variable specification, the r-squared for the visa variable exceeds 0.913. The r-squared for the loan variable exceeds 0.989. This confirms that the enrollment effect is model-improving rather than extraneous complexity.

Both three-variable models achieve significance at the 0.05 level. SBIC indicates two lag optimization for these models. The loan model has a sample size of 25 over the years from 1993 to 2017. The CPI-adjusted tuition model has a sample size of 25 over the years from 1992 to 2016.

The loan model anticipates a temporary increase in total loans, followed by an eventual return to zero. The tuition model allows for the same, but it also indicates the potential establishment of a new normal of high real tuition prices. It does not seem to be the case that a real-world shock would result in one or the other effect. Instead, a real-world H-1B shock would be expected to cause both effects. The interaction between loans and higher tuition effects is weak, as previously noted, but it is positively signed. These models understate the

375 effects of interest if some positive interaction does obtain.

In summary, vector autoregression provides evidence on H-1B visa issuance as a policy instrument. H-1B policy stimulus impacts enrollment and has further indirect effects on aggregate student loans and the real price of tuition. The dynamic response of enrollment and other dependent variables to employer
380 assistance impulse is insignificant.

6. Conclusions

The first goal is to reduce administrative inequities arising from uncertainties. The second goal is to reduce the complexity The third policy goal is.

Of note, the CARES act amends Section 127 to temporarily allow the employer tax deduction to apply for the purposes of paying down existing student
385 loan debts.

Logically, critical access issues appear to exist with this implementation. Solving upward mobility only for those persons who are already employed seems to be a non-starter. A comparatively better access approach would be to allow
390 anyone to take the deduction.

Two additional access problems exist with those who are employed and have benefit access. The SHRM report finds that employer assistance is increasingly being used to obtain a graduate degree.

Finally, Lumina Foundation finds that "only 2-5 percent of eligible employees
395 use tuition assistance programs, and 43 percent of working adults are unaware if their employer offers such a program." Finally,

While access problems attenuate the policy effect, the net effect may be powerful enough to result in a meaningful increase to total enrollment.

Despite logical access problems, it may be the case that the policy incentive
400 is strong enough to generate a meaningful increase to In practice, however, many logical effects can add to a negligible practical effect, motivating the statistical analysis in this paper.

SHRM considers this goal met because Section 127 clarified which expenses

can be considered job-related expenses. SHRM also notes that a prior issue
405 under this policy goal was that "Entry-level employees, for example, rarely
had...legitimate educational assistance paid for by an employer." The analysis
in this paper agrees that Section 127 achieved administrative clarity. This paper
suggests, however, that the clarification created an access issue by restricting
legitimate education to accredited education. This access issue precludes the
410 achievement of certain aspects of the top-level policy goal, and results in further
disadvantage to groups which are already at a disadvantage.

There is another aspect of uncertainty that Section 127 fails to address, which
is uncertainty over time. The initial bill provided for a temporary deduction.
In 2013, an amended bill created a permanent deduction[22]. This solved the
415 temporal uncertainty problem for a while. Under the CARES Act, Section
127 was amended to provide a new benefit on a temporary basis[18]. The new
benefit is that employers may assist employees in paying down existing student
loan debt, rather than only paying for new expenses, in a tax deductible way.
It is reasonable to expect such a measure will improve the student loan debt
420 crisis in the United States. Even so, the measure would be improved according
to own policy goals by making the change permanent.

A slowdown in enrollment occurred around the time Section 127 was created.
After thorough correction, the effect of Section 127 remains negative on total
enrollment over the period from 1992 to 2016. The within-period marginal effect
425 of increasing Section 127 assistance is positive. Vector autoregression does not
indicate that this kind of assistance is useful as a policy tool.

This analysis does indicate that the H-1B policy is an important policy
tool. An increase to the count of H-1B visas issued within-period and between
periods is associated with increases in enrollment, total loans, and the price of
430 education. H-1B policy modification in any direction is not obviously beneficial
based on these criteria alone. Legal immigration has several additional benefits
that exceed the scope of this study. The literature generally suggests that
an increase in H-1B immigration would benefit the economy[23]. There are
substantial distributional effects, but the net distributional effect appears to

435 be desirable. The main effects of increased H-1B labor involve a transfer of wealth from native computer scientists to other people, and other people exhibit significantly higher need on average.

One hypothesis in this paper was that there might be some interaction between H-1B policy and Section 127 assistance. H-1B policy specifies a college-
440 level education as a qualifier for specialized labor. Theoretically, this could incentivize higher college participation by natives due to competitive effects. This study observes no evidence on this kind of effect, but the removal of the college-level qualifier may still prove beneficial. Such a move would open the door to a broader pool of talented foreign labor.

445 Two changes to Section 127 are also worth consideration. The first change addresses access issues to this deduction. Willis Towers Watson estimates that fewer than 10 percent of eligible employees use tuition reimbursement benefits annually[24]. Broader Section 127 access is expected to lead to broader utilization. Additional utilization is expected to improve the significance of the policy
450 effect in an impulse-response specification.

This paper recommends removing the requirement that Section 127 benefit flows through an employer. A modified Section 127 allows an individual to take a Section 127 deduction for themselves or a dependent. Allowing dependents to take the deduction reduces the incentive for students to work full-time.
455 Academic performance suffers for most students that study while working full-time[25]. Allowing an individual to take a deduction without employment would most directly benefit the unemployed. It would also benefit other groups who tend to be impoverished compared to those currently able to utilize Section 127. Evidence indicates there exists significant social value due to crime reduction
460 when relatively impoverished individuals obtain a college degree[26].

The second recommended change is to allow for the deduction of alternative education costs. Many employers have ceased requiring the degree in recent years. Removing the requirement that funds go toward college would reduce upward price pressure on college, and it could incentivize demand for alternative
465 credentials. Employers prefer alternative credentials for specific roles. In many

cases, obtaining an alternative credential involves a focus on obtaining a specific skill. A relatively diverse labor pool utilizes these credentials. Often, these credentials are also more affordable than traditional education.

References

- 470 [1] Vol. 92 STAT. 2763, 95th Congress, 1978. [link].
URL <https://www.govinfo.gov/content/pkg/STATUTE-92/pdf/STATUTE-92-Pg2763.pdf>
- [2] G. Jones, Who benefits from section 127? a study of employee education assistance provided under section 127 of the internal revenue code (2010).
475 URL http://www.cpepea.com/wp-content/uploads/2017/05/10-0418-Coalition-Report-on-Public-Policy-Issue-E-P-E-A_FNL.pdf
- [3] T. W. Anderson, C. Hsiao, Estimation of dynamic models with error components, Journal of the American statistical Association 76 (375) (1981)
480 598–606.
- [4] D. Schenck, Structural vector autoregression models (Sep 2016).
URL <https://blog.stata.com/2016/09/20/structural-vector-autoregression-models/>
- [5] N. National Center for Education Statistics, Table 303.10, total fall enrollment in degree-granting postsecondary institutions, by attendance status, sex of student, and control of institution: Selected years, 1947 through 2028
485 (2019).
URL https://nces.ed.gov/programs/digest/d18/tables/dt18_303.10.asp
- 490 [6] N. National Center for Education Statistics, Table 330.10, average undergraduate tuition and fees and room and board rates charged for full-time students in degree-granting postsecondary institutions, by level and control

of institution: Selected years, 1963-64 through 2016-17 (2017).

URL https://nces.ed.gov/programs/digest/d17/tables/dt17_330.10.asp

[7] Vol. 100 STAT. 2510, 99th Congress, 1986. [link].

URL <https://www.govtrack.us/congress/bills/99/hr3838/text>

[8] U. B. o. E. A. BEA, Personal consumption expenditures (Feb 2020).

URL <https://fred.stlouisfed.org/series/PCE>

[9] FinAid, Loans: Historical loan limits (2020).

URL <https://www.finaid.org/loans/historicallimits.phtml>

[10] C. A. Bureau of, Nonimmigrant visa statistics, nonimmigrant visas by individual class of admission (e.g. a1, a2, etc.) (2020).

URL <https://travel.state.gov/content/travel/en/legal/visa-law0/visa-statistics/nonimmigrant-visa-statistics.html>

[11] N. G. Ruiz, Key facts about the us h-1b visa program, Washington, DC: Brookings (2017).

[12] T. College Board, Trends in student aid 2019 excel data, table 2.ug (2019).

URL <https://research.collegeboard.org/xlsx/trends-student-aid-excel-data.xlsx>

[13] T. College Board, Trends in student aid 2019 (2019).

URL <https://research.collegeboard.org/trends/student-aid>

[14] A. Glass, Roosevelt signs the gi bill of rights into law, june 22, 1944 (Jun 2010).

URL <https://www.politico.com/story/2010/06/roosevelt-signs-the-gi-bill-of-rights-into-law-june-22-1944-038814>

[15] D. o. Veterans Affairs, Veterans educational assistance program (veap) (Mar 2017).

URL <https://www.benefits.va.gov/gibill/veap.asp>

- 520 [16] R. Powers, Learn about the gi bill for post-9/11 active duty service members (Dec 2018).
URL <https://www.thebalancecareers.com/gi-bill-for-the-21st-century-3347143>
- [17] D. o. Veterans Affairs, Forever gi bill - harry w. colmery veterans educational assistance act (Jan 2020).
525 URL <https://www.benefits.va.gov/GIBILL/FGIBSummaries.asp>
- [18] A. Schiavo, What the cares act means for student loan benefits (Apr 2020).
URL <https://www.benefitnews.com/news/what-the-cares-act-means-for-student-loan-benefits>
- 530 [19] V. Ivanov, L. Kilian, A practitioner's guide to lag order selection for var impulse response analysis, *Studies in Nonlinear Dynamics & Econometrics* 9 (1) (2005).
- [20] C. Maldonado, Price of college increasing almost 8 times faster than wages, *Forbes Magazine Online* (2018).
- 535 [21] Edvisors, Why do tuition rates rise faster than inflation? (Dec 2019).
URL <https://www.edvisors.com/plan-for-college/saving-for-college/tuition-inflation/>
- [22] W. Baldwin, Paying for college: Section 127 employer aid (Mar 2013).
URL <https://www.forbes.com/sites/baldwin/2013/02/28/section-127-tuition-aid/>
540
- [23] J. Bound, G. Khanna, N. Morales, Understanding the economic impact of the h-1b program on the us, Tech. rep., National Bureau of Economic Research (2017).
- [24] A. Merrick, Education benefits present a learning opportunity (Aug 2019).
545 URL <https://www.shrm.org/hr-today/news/hr-magazine/spring2019/pages/education-benefits-present-learning-opportunity.aspx>

- [25] M. St. Amour, Most college students work, and that's both good and bad (Nov 2019).

550

URL <https://www.insidehighered.com/news/2019/11/18/most-college-students-work-and-thats-both-good-and-bad>

- [26] C. R. Dennison, The crime-reducing benefits of a college degree: evidence from a nationally representative us sample, *Criminal Justice Studies* 32 (4) (2019) 297–316.