**Data Appendix**

# The Effects of High School Career and Technical Education on Employment, Wages, and Educational Attainment

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## A. High School Curricula Construction Rules

### A.1 High School Course Mapping

The transcript courses in ELS:2002 are coded using the Classification of Secondary School Courses (CSSC), a coding system based on the High School Transcript Studies conducted by the NCES (National Center for Education Statistics, 2000). All U.S. high school courses are coded with a six digit code, organized by course type. The first two digits, which denote the main program area, range from 01 – 56. See Table A.1 for how these codes are mapped to the five high school fields in my model (*Academic, General Education, Business Vocational, Trade Vocational, and Other Curriculum*).

Table A.1: CSSC Code Mapping

| Course Content | CSSC Code |
|---|---|
| *Academic Courses* | |
| Area and Ethnic Studies (Honors) | 050105, 050116, 050120, 050126 |
| Computer and Information Sciences (Honors/AP/IB) | 110132-44, 110212, 110213 |
| Engineering | 14**** |
| Foreign Languages (Honors/AP/IB/CEEB Prep) | 160517, 160544, 160545, 160556, 160907, 160917, 160937, 160943-52 |
| Letters/English (Honors/AP/IB) | 230102, 230105, 230108, 230111, 230114, 230117, 230165-71 |
| Liberal/General Studies (Gifted / College Level) | 240141, 240151 |
| Life Sciences (Honors/AP/IB) | 260141-46 |
| Mathematics (Honors/AP/IB/Advanced) | 270410, 270414, 270415, 270417-20, 270424, 270429-35, 270532 |
| Multi/Interdisciplinary Studies (IB/Advanced) | 300112-21, 300623 |
| Philosophy and Religion (IB) | 380142 |
| Physical Sciences (Honors/AP/IB/ Advanced) | 400300, 400521-41, 400622, 400821-31 |
| Psychology (AP/IB) | 420114, 420115 |
| Social Sciences (Honors/AP/IB) | 450613-16, 450711, 450803, 450806, 450808, 450836, 450850, 450853, 450856, 450870-74, 450921, 451013, 451015, 451018, 451034-37, 451171-81 |
| *General Education Courses* | |
| Area and Ethnic Studies (non-honors) | 05**** |
| Foreign Languages (non-honors) | 16**** |
| Letters/English (non-honors) | 23**** |
| Liberal/General Studies (non-honors) | 24**** |
| Life Sciences (non-honors) | 26**** |
| Mathematics (non-honors) | 27**** |
| Multi/Interdisciplinary Studies (non-honors) | 30**** |

| | |
|---|---|
| Philosophy and Religion (non-honors) | 38**** |
| Physical Sciences (non-honors) | 40**** |
| Science Technologies | 41**** |
| Psychology (non-honors) | 42**** |
| Public Affairs | 44**** |
| Social Sciences (non-honors) | 45**** |

| *Business Vocational Courses* | |
|---|---|
| Business and Management | 06**** |
| Business and Office | 07**** |
| Marketing and Distribution | 08**** |
| Communications (except Journalism and Special languages) | 09**** |
| Computer and Information Sciences (non-honors) | 11**** |
| CTE Business and Office | 552*** |

| *Trade Vocational Courses* | |
|---|---|
| Communications Technologies | 10**** |
| Consumer, Personal, and Miscellaneous Services | 12**** |
| Engineering and Engineering-related Technologies | 15**** |
| Industrial Arts | 21**** |
| Protective Services | 43**** |
| Construction Trades | 46**** |
| Mechanics and Repairers | 47**** |
| Precision Production | 48**** |
| Transportation and Material Moving | 49**** |
| CTE Industrial Arts, CTE Precision Production, CTE Trades & Industrial Construction, CTE Mechanics & Repairers, Service Occupations | 555***, 557***, 558***, 559*** |

| *Other Curriculum Courses* | |
|---|---|
| Architecture and Environmental Design | 04**** |
| Communications (Journalism and Special languages) | 0904**, 0908** |
| Education | 13**** |
| Home Economics | 19**** |
| Vocational Home Economics | 20**** |
| Law | 22**** |
| Summer Abroad, Independent Study, Other Liberal/General Studies | 240121, 2401131, 240100 |
| Library and Archival Sciences | 25**** |
| Military Sciences | 28**** |
| Military Technologies | 29**** |
| Parks and Recreation | 31**** |
| Citizenship/Activities | 33**** |
| Health Related Activities | 34**** |
| Interpersonal Skills | 35**** |
| Leisure and Recreational Activities | 36**** |
| Personal Awareness | 37**** |
| Theology | 39**** |
| Visual and Performing Arts | 50**** |
| Executive Internship | 51**** |

| | |
|---|---|
| General EMH (Including Pre-vocational Programs) | 52**** |
| Special Education | 54**** |
| Vocational Career Prep / Exploration, CTE Home Economics | 550***, 554*** |
| Special Education – Resource Curriculum | 56**** |
| Agribusiness and Agricultural Production | 01**** |
| Agricultural Sciences | 02**** |
| Renewable Natural Resources | 03**** |
| CTE Agriculture | 551*** |
| Allied Health | 17**** |
| Health Sciences | 18**** |
| CTE Health Occupations | 553*** |
| Basic Skills | 32**** |

Notes:
1) "*" Indicates that all courses within the program area, not listed elsewhere, fall within the stated course content.

## A.2 Yearly Curriculum Construction Rule Details

I assign a yearly field concentration to each year of high school based on the credit hours and field types of the classes the individual passed during the year. Each individual takes six credit hours of classes in a given year.[1] I assign yearly field concentration as described below. This specification is similar to other specifications used in the literature, such as Meer (2007).

- The year is coded as a Trade Vocational yearly field concentration if the individual took more Trade Vocational credits than either Business Vocational credits or Academic credits *AND* took 1.25 or more Trade Vocational credits.
- The year is coded as a Business Vocational yearly field concentration if the individual took more Business Vocational credits than either Trade Vocational credits or Academic credits *AND* took 1.25 or more Business Vocational credits.
- The year is coded as an Academic yearly field concentration if the individual took more Academic credits than either Trade Vocational credits or Business Vocational credits *AND* took 1.25 or more Academic credits.
- The year is coded as a General Education yearly field concentration if the individual took 1.25 or more General Education credits *AND* took less than 1.25 Trade Vocational credits,

[1] Credit hours from schools that assign a different number of credit hours in a year (e.g. 12 credit hours per year) are first adjusted so that the average number of credit hours taken by a full time student at that school each year is six.

took less than 1.25 Business Vocational credits, took less than 1.25 Academic credits, and took less than 2 Other Curriculum credits.

- The year is coded as an Other Curriculum yearly field concentration if the individual took 2 or more Other Curriculum credits *AND* took less than 1.25 Trade Vocational credits, took less than 1.25 Business Vocational credits, and took less than 1.25 Academic credits.
- The year is coded as an Other Curriculum yearly field concentration if an individual took less than 1.25 credits in each of the other four fields.
- In the event of ties, the tiebreaking order is Trade Vocational, Business Vocational, Academic.[2]

### A.3 Alternative Curriculum Construction Rules

I investigated three alternative curriculum construction rules. The first rule defines an individual's overall curriculum as the yearly field concentration (constructed as described above) taken during her senior year. The second rule aggregates a student's classes and credit hours across all four years of high school and then chooses an overall concentration based on aggregate credit hours in each field.[3] Finally, the third rule defines an individual's overall curriculum as the value of the pre-constructed variable in the ELS:2002 data set that assigned high school graduates to either an academic, occupational, academic & occupational, or other curriculum.

See Table A.2 for a comparison of how aggregate outcomes change with each of the four construction rules. The table shows that curriculum outcomes are very similar across all four construction rules.

[2] 0.2% of student-year curricula observations had ties. Using alternative tiebreaking orders does not affect the estimation results.

[3]For this alternative construction rule I followed the yearly field concentration rules as defined above, except with slightly different credit assignment ratios (taking the place of 1.25 out of 6 and 2 out of 6): 3 out of 24 for trade vocational, business vocational, and academic, 6 out of 24 for general education, and 8 out of 24 for other curricula. These ratio's were chosen to take into account the large number of general education and other curricula courses that individual's take during their first and second years of high school, and to roughly follow the construction rules used in the previous literate (e.g. Meer, 2007).

## Table A.2: Curriculum Construction Rule Comparison

| HS Curriculum | Constructed Outcomes | Alternative 1: Senior Year Classes | Alternative 2: All Classes | Alternative 3: ELS Concentrations | |
|---|---|---|---|---|---|
| Academic | 27.2% | 25.2% | 30.6% | *Academic* | 24.6% |
| Gen Ed | 42.9% | 46.0% | 44.3% | *Occupational* | 12.6% |
| Bus Voc | 7.0% | 6.7% | 5.8% | *Acad & Occ* | 2.3% |
| Trade Voc | 5.8% | 5.2% | 5.8% | *Other* | 60.4% |
| Other | 17.2% | 16.8% | 13.5% | | |

Notes:

1) Total # of classifiable observations varies across construction rules based on available data, from 11,880 to 14,810.

2) Sample sizes are rounded to the nearest ten to comply with secure data disclosure requirements.

**B. Employment Construction Rules**

An ELS:2002 survey participant denoted her occupations between the years of 2002 and 2012 using six-digit O*NET occupation codes. ELS:2002 survey staff then mapped these six-digit O*NET occupation codes to one of 14 constructed occupations (Ingels et al., 2014). See Table B.1 for how these 14 occupations are mapped into the five occupation choices in my model (*Professional, Skilled Manuel Labor, Skilled Non-manual Labor, Skilled Other, and Unskilled*).

Table B.1: 2002-2012 Occupation Code Mapping

| Coded Occupation | ELS:2002 Occupation |
|---|---|
| *Professional* | |
| | Manager, Administrator |
| | Professional A |
| | Professional B |
| *Skilled Manual Labor* | |
| | Craftsperson |
| | Operative |
| | Technical |
| | Protective Service |
| | Laborer (skilled, see notes) |
| *Skilled Non-Manual Labor* | |
| | Clerical |
| | Sales |
| | Service (skilled, see notes) |
| *Skilled Other* | |
| | Farmer, Farm Manager |
| | Military |
| | School Teacher |
| *Unskilled* | |
| | Laborer (unskilled, see notes) |
| | Service (unskilled, see notes) |

Notes:

1) Based on six-digit O*NET codes, the following Laborer and Service occupations were coded as Unskilled Occupations: Merchandise Displayers and Window Trimmers; Lifeguards, ski patrol, and other recreational protective service workers; cooks – fast food; food prep, bartenders, counter attendants, waiters, hosts, dishwashers; janitors and cleaners; Attendants (service stations, ticket takers, etc); bellhops; and cashiers. All other Laborer and Service occupations were coded as Skilled Manual Labor and Skilled Non-Manual Labor occupations, respectively.

An ELS:2002 survey participant denoted her occupations prior to 2002 by selecting one of 15 occupation types. The 15 occupation types available were chosen by ELS:2002 survey staff. See table B.2 for how these 15 occupations are mapped into the five occupation choices in the model (*Professional, Skilled Manuel Labor, Skilled Non-manual Labor, Skilled Other, and Unskilled*).

Table B.2: 2000-2001 Occupation Code Mapping

| Coded Occupation | ELS:2002 Occupation |
|---|---|
| *Professional* | |
| | *No Codes* |
| *Skilled Manual Labor* | |
| | Construction work |
| | Beautician, hair stylist, barber |
| *Skilled Non-Manual Labor* | |
| | Salesperson, customer service |
| | Computer related job |
| | General office or clerical worker |
| *Skilled Other* | |
| | Farm worker |
| | Hospital or health worker |
| *Unskilled* | |
| | Food service/server/host/dishwasher |
| | Babysitter or child care |
| | Cashier, grocery clerk/bagger |
| | Lawn work or odd jobs |
| | Camp counselor/lifeguard/coach |
| | Warehouse worker |
| | House cleaning or janitorial work |
| *Unknown Occupation* | |
| | Other |

## C. Local Labor Market Characteristic Construction Rules

### C.1 Local Labor Market Industry Mapping

Bureau of Economic Analysis Local Area Personal Income & Employment data (U.S. Bureau of Economic Analysis, 2002) contains county-level employment percentages for each two-digit NAICS industry. See Table C.1 for how each two-digit NAICS industries is mapped into one of four constructed industries (*Professional Industries, Skilled Manuel Labor Industries, Skilled Non-manual Labor Industries, and Other Industries*).

Table C.1: Local Labor Market Industry Mapping

| Industry | NAICS Industry Code |
|---|---|
| *Professional* | |
| Professional, Scientific, and Technical Services | 54 |
| Management of Companies and Enterprises | 55 |
| *Skilled Manual Labor* | |
| Mining | 21 |
| Utilities | 22 |
| Construction | 23 |
| Manufacturing | 31-33 |
| Transportation and Warehousing | 48-49 |
| Waste Management | 562 |
| Other Services (Repair and Maintenance) | 811 |
| *Skilled Non-Manual Labor* | |
| Wholesale Trade | 42 |
| Retail Trade | 44-45 |
| Information | 51 |
| *Finance and Insurance* | 52 |
| Real Estate and Rental and Leasing | 53 |
| *Other* | |
| Farm Employment | NA |
| Agriculture, Forestry, Fishing, and Hunting | 11 |
| Administration | 561 |
| Educational Services | 61 |
| Health Care and Social Assistance | 62 |
| Arts, Entertainment, and Recreation | 71 |
| Accommodation and Food Services | 72 |
| Other Services (Everything except Repair and Maintenance) | 812,813,814 |
| Public Administration | 92 |

## C.2 Industry / Occupation Comparison

As discussed in Section 4.1, local labor market industry variables are used because local labor market occupation data is not available at the county level. However, occupation data is only available at the national level and for each metropolitan statistical area in the United States. This occupation data is available from the Bureau of Labor Statistics' Occupational Employment Statistics (OES) program (U.S. Bureau of Labor Statistics, 2002). In order to compare industry percentages and occupation percentages at the national and MSA level, I first map each Standard Occupation Classification (SOC) System occupation code into one of four constructed occupations (*Professional Occupations, Skilled Manuel Labor Occupations, Skilled Non-manual Labor Occupations, and Other Occupations*) as described in Table C.2.

Table C.2: Local Labor Market Occupation Mapping

| Occupation | SOC Code |
|---|---|
| *Professional* | |
| Management Occupations | 11 |
| Computer and Mathematical Occupations | 15 |
| Architecture and Engineering Occupations | 17 |
| Life, Physical, and Social Science Occupations | 19 |
| Legal Occupations | 23 |
| Healthcare Practitioners and Technical Occupations | 29 |
| *Skilled Manual Labor* | |
| Construction Trades and Extraction Workers | 47 |
| Installation, Maintenance, and Repair Workers | 49 |
| Production Occupations | 51 |
| Transportation and Material Moving Occupations | 53 |
| *Skilled Non-Manual Labor* | |
| Business Operations and Financial Specialists | 13 |
| Sales Occupations | 41 |
| Office and Administrative Support Occupations | 43 |
| *Other* | |
| Community and Social Science Occupations | 21 |
| Education, Training, and Library Occupations | 25 |
| Arts, Design, Entertainment, Sports, and Media Occupations | 27 |
| Healthcare Support Occupations | 31 |
| Protective Service Occupations | 33 |
| Food Preparation and Serving Occupations | 35 |
| Building and Ground Cleaning and Maintenance Occupations | 37 |
| Personal Care and Service Occupations | 39 |
| Farming, Fishing, and Forestry Occupations | 45 |
| Military Specific Occupations | 55 |

Table C.3 presents a comparison of national occupation percentages and industry percentages using my constructed occupations and industries. Table C.4 provides the average difference across MSAs between occupation percentages and industry percentages. Finally, Table C.5 provides a more detailed crosswalk between national occupation percentages, broken down by OCCSOC codes, and national industry percentages, broken down by two-digit NAICS industry codes. Tables C.3, C.4, and C.5 show that the industry mapping used to create my local labor market characteristic variables reasonably reflect OCC occupation mappings at the national level and within MSAs. As such, my local labor market industry percentages are likely a good proxy for local labor market occupation percentages at the county level.

## Table C.3: National Constructed Industy / Occupation Crosswalk

| *Occupations* | *Industries* | | | |
|---|---|---|---|---|
| | Professional | Sk. Manual Labor | Sk. Non-Manual Labor | Other |
| Professional | **47.5%** | 10.1% | 11.6% | 16.8% |
| Sk. Manual Labor | 5.8% | **71.7%** | 16.0% | 8.7% |
| Sk. Non-Manual Labor | 38.8% | 16.0% | **65.0%** | 20.7% |
| Other | 7.8% | 1.9% | 6.7% | **53.7%** |

Notes:
1) Constructed occupations are on the y-axis, and constructed industries are on the x-axis.
2) Data is from 2002.

## Table C.4: Constructed Industy / Occupation Variable Difference Across MSAs

| | Professional | Sk. Manual Labor | Sk. Non-Manual Labor | Other |
|---|---|---|---|---|
| Mean | -9% | -1% | -8% | 17% |
| Std Dev | 3% | 5% | 3% | 6% |

Notes:
1) Percentages are industry percentages minus occupation percentages.
2) Data is from a comparison of 295 MSAs in 2002.

## Table C.5: Detailed National Crosswalk

| *SOC Occupations* | *NAICS Industries* | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Professional | | Sk. Manual Labor | | | | | | | | | | Sk. Non-Manual Labor | | | | | | Other | | | | | | | |
| | 54 - Professional Services | 55 - Management | 21 - Mining | 22 - Utilities | 23 - Construction | 31 - Manufacturing A | 32 - Manufacturing B | 33 - Manufacturing C | 48 - Transportation A | 49 - Transportation B | 562 - Waste Management | 811 - Repair | 42 - Wholesale Trade | 44 - Retail Trade A | 45 - Retail Trade B | 51 - Information | 52 - Finance & Insurance | 53 - Real Estate & Leasing | 11 - Agriculture & Forestry | 561 - Administration | 61 - Education | 62 - Health Care | 71 - Arts | 72 - Lodging & Food | 812-4 - Other Services | 92 - Public Administration |
| Professional | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 - Management | 9% | 16% | 6% | 6% | 6% | 4% | 6% | 6% | 4% | 4% | 6% | 4% | 7% | 4% | 3% | 8% | 9% | 11% | 3% | 3% | 5% | 4% | 5% | 4% | 8% | 6% |
| 15 - Computer / Mathematical | 11% | 9% | 1% | 3% | 0% | 0% | 1% | 2% | 0% | 1% | 0% | 0% | 3% | 1% | 0% | 10% | 5% | 1% | 0% | 1% | 1% | 0% | 0% | 0% | 1% | 2% |
| 17 - Architecture / Engineering | 16% | 3% | 4% | 8% | 1% | 1% | 2% | 8% | 0% | 1% | 2% | 0% | 1% | 0% | 0% | 2% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 3% |
| 19 - Sciences | 5% | 2% | 3% | 2% | 0% | 1% | 3% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 1% | 0% | 1% | 1% | 0% | 0% | 0% | 3% |
| 23 - Legal | 6% | 1% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 3% |
| 29 - Health Technical | 3% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 4% | 0% | 0% | 0% | 1% | 0% | 2% | 2% | 32% | 1% | 0% | 0% | 4% |
| Sk. Manual Labor | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 - Construction / Extraction | 1% | 1% | 33% | 7% | 67% | 0% | 2% | 2% | 1% | 0% | 18% | 1% | 0% | 0% | 0% | 0% | 0% | 2% | 0% | 2% | 0% | 0% | 0% | 0% | 0% | 5% |
| 49 - Maintenance / Repair | 1% | 2% | 9% | 26% | 8% | 5% | 6% | 4% | 8% | 3% | 6% | 50% | 7% | 7% | 2% | 8% | 0% | 14% | 2% | 2% | 1% | 1% | 3% | 1% | 1% | 4% |
| 51 - Production | 2% | 2% | 10% | 12% | 1% | 55% | 49% | 54% | 1% | 3% | 3% | 7% | 7% | 3% | 1% | 4% | 0% | 1% | 4% | 8% | 0% | 1% | 0% | 1% | 9% | 2% |
| 53 - Transportation | 1% | 3% | 17% | 2% | 3% | 16% | 13% | 5% | 56% | 58% | 44% | 18% | 20% | 9% | 6% | 3% | 0% | 7% | 13% | 10% | 3% | 1% | 2% | 2% | 5% | 4% |
| Sk. Non-Manual Labor | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 - Business Ops / Financial | 9% | 14% | 4% | 7% | 2% | 1% | 2% | 3% | 2% | 2% | 2% | 1% | 3% | 1% | 1% | 4% | 19% | 3% | 0% | 2% | 2% | 1% | 1% | 0% | 8% | 8% |
| 41 - Sales | 4% | 5% | 1% | 2% | 2% | 4% | 3% | 2% | 2% | 3% | 2% | 5% | 25% | 50% | 56% | 13% | 13% | 22% | 1% | 9% | 0% | 0% | 8% | 4% | 6% | 1% |
| 43 - Office & Admin Support | 24% | 34% | 10% | 23% | 9% | 8% | 11% | 10% | 19% | 25% | 12% | 11% | 24% | 14% | 20% | 23% | 50% | 22% | 5% | 22% | 11% | 17% | 10% | 4% | 17% | 25% |
| Other | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 - Community / Social Sci | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 2% | 6% | 0% | 0% | 4% | 4% |
| 25 - Education | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 58% | 3% | 2% | 0% | 3% | 2% |
| 27 - Arts | 4% | 1% | 0% | 1% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 2% | 16% | 0% | 1% | 0% | 0% | 1% | 0% | 9% | 0% | 2% | 1% |
| 31 - Heath Support | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 19% | 0% | 0% | 1% | 2% |
| 33 - Protective Service | 0% | 1% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 2% | 0% | 13% | 1% | 0% | 4% | 1% | 1% | 18% |
| 35 - Food Prep & Serving | 0% | 1% | 0% | 0% | 0% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 4% | 1% | 2% | 0% | 2% | 0% | 1% | 4% | 3% | 18% | 75% | 4% | 1% |
| 37 - Building Maintenace | 1% | 1% | 0% | 1% | 1% | 1% | 1% | 1% | 0% | 1% | 1% | 1% | 1% | 1% | 0% | 1% | 0% | 10% | 1% | 21% | 5% | 3% | 10% | 6% | 4% | 2% |
| 39 - Personal Care | 1% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 5% | 0% | 0% | 0% | 0% | 0% | 0% | 3% | 0% | 2% | 1% | 1% | 2% | 7% | 26% | 2% | 24% | 3% |
| 45 - Farming & Forestry | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 68% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 55 - Military | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

Notes:

1) Percentages aggregate vertically. They display the occupational breakdown of types of job in each industry nationwide.

2) Constructed occupations are on the y-axis, and constructed industries are on the x-axis.

3) Data is from 2002.

## D. Variable Construction Details

### D.1 ELS:2002 Raw Variables

This subsection provides additional information about the data elements available in ELS:2002 that are used to construct the variables used in this paper. See table D.1 for a list of the variables in the ELS:2002 raw data file that are used to create log-hourly wage, high school attendance, PSE attendance, and employment outcomes each year. The Stata do files that map this information into the variables discussed in Section 4 are available upon request.

### D.2 Additional Imputation Rules

As discussed in Section 4.2, choice information is missing for many student-year observations in the data set. In addition, conflicting choice information is provided for a small number of student-year observations. See Table D.2 for details on how a subset of these missing student-year observations are imputed based on available data as well as how conflicting choice information is coded. The Stata do files that contain these rules are available upon request.

## Table D:1: Raw Variables

| Constructed Variable / Raw Variables |
|---|
| *High School Attendance* |
| High School Transcript data 2000-2003 (courses, credits, grades) |
| Year/month graduated from high school, and type of graduation (GED or diploma) |
| Year/month left high school (prior to 2006) and why (graduated, dropped out, or transferred) |
| High School grade attended in 2003 |
| Enrolled in the spring of 2003 (Y/N) |
| Enrolled in the spring of 2004 (Y/N) |
| Working towards graduation (GED) in 2012 (Y/N) |
| Failed 9th or 10th grade (Y/N) |
| Failed 11th or 12th grade (Y/N) |
| Dropouts |
| Year/month first dropped out |
| Year/month first returned |
| Year/month second dropped out |
| Last grade attended before dropping out and whether passed/failed |
| Attended High School in 2002 (Y/N) |
| *Post-Seconardry Education Attendance* |
| Year/month first began attending a PSE intuition, and institution type |
| Year/month began attending most recent PSE intuition, and institution type |
| Year/month last attended most recent PSE intuition, and institution type |
| Year/month first received a PSE degree, and degree type |
| Year/month received highest PSE degree, anddegree type |
| Ever attended a PSE (asked in both 2006 and 2012) (Y/N) |
| Attended a PSE institution, and institution type, monthly from 2003 to 2005 (Y/N) |
| Attending a PSE institution in 2012 and institution type (Y/N) |
| *Employment* |
| Prior to Jun 2012: Occupation type and year/month began and ended most recent job |
| Prior to Jan 2006: Occupation type and year/month began and ended first job after high school |
| Occupation type and year/month began the job employed in during Jan 2006. |
| Prior to May 2002: Occupation type and year/month began and ended most recent job |
| Occupation and hours worked a week in 2001 |
| Whether working in 2012 |
| Number of weeks employed in 2011 |
| Whether working for six or more months in 2010 and 2009 |
| Whether employed each month from Jun 2002 to Jan 2006 |
| Number of hours worked a week in 2001 and 2003 |
| Whether working in 2003 |
| Year/month began and ended most recent job (as of '03), only for dropouts and early graduators |
| *Log Hourly Wages* |
| Wages current / most recent job as of 2012 |
| Wages in 2011 |
| Wages in 2005 |
| Wages first job after school (prior to Jan 2006) |
| Wages current / most recent job (as of Jan 2006) |
| Wages current / most recent job (as of 2003), only for dropouts and early graduators |

## Table D.2: Additional Interpolation Rules (for Years with Missing Data)

| Constructed Variable / Raw Variables |
|---|
| *High School Attendance* |
| *On Time Graduates* : Individuals that graduated on time (in 2003) are coded as attending in 2000, 2001, and 2002 |
| *Early Graduates* : Individuals that graduated early (in 2002 or 2001) are coded as attending in 2000 and 2001, and are coded as already having finished 1-2 years of high school (respectively) prior to 2000 |
| *Late Graduates* : Individuals that graduated after 2003 are coded as attending in the year of graduation |
| All years after graduation are coded as not attending |
| *Dropouts* : Every year after final dropout, including final dropout year, is coded as not attending. Every year before first dropout year is coded as attending. If dropped out twice, year of return is coded as attending and year of first dropout is coded as not attending |
| *Post-Seconardry Education Attendance* |
| Individuals that attended a PSE institution for at least six months in a year are coded as attending that year |
| Every year before began attending first PSE institution is coded as not attending |
| Every year after last began attending most recent PSE institution is coded as not attending |
| If the first year attended and most recent year attended are both at 4-yr institutions, and the years are four years apart, the two years between them are coded as attending 4-yr institutions |
| *Employment* |
| Code as working (type unknown) if worked more than six months each year |
| Code as working if worked more than 20 hours a week in 2001 |
| *Conflicting Data* |
| When data on whether an individual attended HS / PSE full-time or part-time is missing, I code individuals as follows: |
| a. Individuals that attended school (credit amount unknown) and worked during any year between 2000 and 2008 are coded as attended school |
| b. Individuals that attended school (credit amount unknown) and worked during any year between 2009 and 2012 are coded as worked |

Notes:

1) These interpolation rules are only used for student-years for which outcomes are unobserved in the data.

## E. First Stage Regression Results

### E.1 High School Curriculum

The first-stage regression, used to construct high school curriculum predicted probabilities, is a multinomial logit regression of high school curriculum on personal characteristics ($X_i$), local labor market characteristics ($M_i$), and high school vocational instruments ($I_i$). The estimates from the first-stage regression are displayed in Table E.1; note that all estimates are relative to graduating high school in a general education curriculum. Overall, men are more likely to concentrate in a trade vocational field then women. Specifically, men receive 1.43 more utils than women from concentrating in the trade vocational curriculum relative to concentrating in the general education curriculum. Next, Caucasian individuals are more likely than black, Hispanic, and other race individuals to concentrate in a trade vocational, business vocational, or other curriculum, and individuals who attend Catholic or non-Catholic private high schools are very likely to take general education courses as opposed to academic or vocational courses and are also very unlikely to drop out of high school. Local labor market characteristics have little effect on curriculum take-up, although there are a few exceptions. For example, as the hourly wage increases in the county where the school is located, the number of individuals who concentrate in other curricula decreases, and as the percent of manual labor employment increases in the county where the school is located, the number of individuals who concentrate in a trade vocational curriculum increases.

Each instrument has a significant effect on the utility associated with at least one high school curriculum relative to graduating in the general education field, with the exception of whether most vocational courses are taught in the high school, at an area vocational school, or both (this variable has a positive but statistically insignificant effect on concentrating in a trade or business vocational curriculum).[4] As the number of individuals in the previous year's graduating class who took vocational courses increases, the probability that an individual concentrates in a trade vocational curriculum or a business vocational curriculum increases. Next, when business courses such as marketing are taught on-site, individuals are more likely to concentrate in business vocational fields. When trade courses such as precisions are taught on-site, individuals are more

[4] The first-stage estimates for vocational course location are significant for many alternative specifications of the instrument subset. As discussed in Section 4.1 of LaForest (2017), changing the instrument subset has little effect on the estimates in the second-stage regressions. The instrument subset presented here was chosen to be indicative of the full set of variables available in ELS:2002.

Table E.1: Selected First Stage Estimates

| Variable | Academic | | Business Voc | | Trade Voc | | Other | | GED | | Dropping Out | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* |
| *1. Personal Characteristics* | | | | | | | | | | | | |
| Male | **-0.36** *** | *0.06* | -0.05 | *0.08* | **1.43** *** | *0.11* | **-0.18** *** | *0.05* | **0.62** *** | *0.11* | **0.42** *** | *0.08* |
| Black | 0.02 | *0.12* | -0.15 | *0.15* | **-0.83** *** | *0.17* | **-0.37** *** | *0.10* | **-0.62** *** | *0.19* | -0.22 | *0.15* |
| Hispanic | -0.14 | *0.10* | **-0.56** *** | *0.18* | **-0.83** *** | *0.18* | **-0.36** *** | *0.10* | -0.23 | *0.20* | 0.21 | *0.13* |
| Other Race | **0.60** *** | *0.08* | -0.06 | *0.14* | **-0.39** *** | *0.15* | **-0.36** *** | *0.11* | -0.04 | *0.18* | 0.19 | *0.14* |
| Socio-Economic Status | **0.24** *** | *0.03* | **-0.11** ** | *0.05* | **-0.16** *** | *0.06* | -0.04 | *0.03* | **-0.18** *** | *0.06* | **-0.39** *** | *0.05* |
| Test Score | **1.34** *** | *0.04* | -0.07 | *0.05* | **-0.36** *** | *0.05* | **-0.29** *** | *0.04* | **-0.14** ** | *0.07* | **-0.66** *** | *0.05* |
| Midwest | **-0.43** *** | *0.13* | -0.22 | *0.19* | **-0.41** ** | *0.19* | **0.27** * | *0.15* | -0.24 | *0.26* | **-0.43** ** | *0.19* |
| South | 0.08 | *0.13* | -0.03 | *0.18* | **-0.56** *** | *0.20* | 0.03 | *0.15* | 0.16 | *0.25* | **-0.39** ** | *0.19* |
| West | **-0.65** *** | *0.14* | **-1.29** *** | *0.25* | **-0.85** *** | *0.26* | -0.03 | *0.19* | **-0.63** ** | *0.28* | **-0.84** *** | *0.23* |
| Suburban | **-0.33** *** | *0.10* | -0.06 | *0.15* | 0.24 | *0.16* | 0.11 | *0.11* | -0.12 | *0.16* | -0.20 | *0.13* |
| Rural | **-0.46** *** | *0.14* | -0.06 | *0.18* | -0.10 | *0.21* | 0.12 | *0.14* | -0.16 | *0.24* | -0.01 | *0.20* |
| Catholic School | **-0.83** *** | *0.19* | 0.18 | *0.29* | **-0.85** ** | *0.36* | **-1.44** *** | *0.27* | **-1.33** *** | *0.41* | **-1.74** *** | *0.32* |
| Non-Catholic Private School | **-1.07** *** | *0.21* | **-0.78** ** | *0.32* | **-1.32** *** | *0.41* | **-1.46** *** | *0.27* | **-0.83** ** | *0.39* | **-1.01** *** | *0.28* |
| *2. Local Labor Market Characteristics* | | | | | | | | | | | | |
| Unemployment Rate | -0.60 | *3.12* | 4.83 | *4.06* | -1.57 | *5.04* | -1.01 | *2.80* | -0.83 | *4.26* | -3.58 | *3.01* |
| (ln) Average Hourly Wage | 0.08 | *0.28* | -0.08 | *0.41* | -0.27 | *0.45* | **-0.74** ** | *0.32* | -0.39 | *0.49* | -0.32 | *0.37* |
| % Professional Employment | 0.40 | *2.09* | 0.81 | *2.73* | -0.65 | *3.59* | 0.89 | *2.31* | -5.16 | *3.54* | -3.11 | *2.99* |
| % Manual Labor Employment | -0.32 | *0.70* | 0.54 | *0.90* | **2.25** ** | *1.10* | **-1.27** * | *0.67* | -1.21 | *0.99* | -1.10 | *0.93* |
| % Non-Manual Labor Employment | -0.10 | *1.22* | 1.87 | *1.74* | 0.17 | *2.05* | -1.31 | *1.21* | -1.43 | *1.85* | 0.64 | *1.63* |
| *3. Vocational Instruments* | | | | | | | | | | | | |
| Voc Taught in High School | -0.05 | *0.16* | 0.37 | *0.31* | 0.43 | *0.30* | 0.13 | *0.16* | -0.24 | *0.36* | 0.26 | *0.25* |
| Voc Taught in Area School | **-0.29** ** | *0.14* | 0.21 | *0.35* | 0.16 | *0.28* | 0.03 | *0.17* | -0.29 | *0.43* | **0.45** * | *0.26* |
| Voc Taught in Both HS & Area Sch | -0.14 | *0.16* | 0.33 | *0.32* | 0.22 | *0.30* | 0.14 | *0.17* | -0.15 | *0.38* | 0.30 | *0.25* |
| Marketing Courses Taught On-Site | -0.03 | *0.12* | **0.61** *** | *0.17* | 0.15 | *0.17* | **0.20** * | *0.11* | **0.36** ** | *0.18* | 0.06 | *0.14* |
| Marketing Courses Taught at Area Sch | **-0.31** * | *0.18* | 0.08 | *0.25* | 0.04 | *0.27* | 0.09 | *0.16* | -0.01 | *0.28* | -0.24 | *0.24* |
| Precisions Courses Taught On-Site | 0.15 | *0.14* | -0.16 | *0.20* | **0.42** ** | *0.20* | -0.06 | *0.14* | -0.02 | *0.23* | 0.18 | *0.19* |
| Precisions Courses Taught at Area Sch | -0.03 | *0.16* | -0.13 | *0.22* | **0.41** * | *0.24* | -0.14 | *0.17* | -0.03 | *0.26* | 0.16 | *0.21* |
| # Vocational Teachers per 100 Students | **-0.26** ** | *0.11* | 0.07 | *0.13* | **0.16** * | *0.09* | 0.06 | *0.08* | -0.10 | *0.13* | 0.03 | *0.11* |
| Career Pathways Prog Available | 0.14 | *0.10* | **0.31** * | *0.17* | 0.26 | *0.19* | -0.02 | *0.11* | -0.09 | *0.45* | 0.03 | *0.21* |
| % Students Free/Reduced Price Lunch | 0.12 | *0.22* | -0.10 | *0.32* | 0.31 | *0.31* | -0.07 | *0.21* | 0.08 | *0.35* | **0.46** * | *0.25* |
| % Students Take Academic Courses | -0.06 | *0.20* | **-0.55** ** | *0.27* | -0.20 | *0.31* | **-0.62** *** | *0.17* | **-1.88** *** | *0.70* | 0.16 | *0.35* |
| % Students Take Vocational Courses | 0.45 | *0.45* | **1.00** *** | *0.37* | **1.88** *** | *0.43* | **1.19** *** | *0.34* | **1.92** ** | *0.90* | 0.42 | *0.53* |
| % Prev Students Enter Labor Market (0-5) | -0.04 | *0.07* | 0.12 | *0.09* | 0.10 | *0.10* | 0.06 | *0.06* | **-0.41** * | *0.24* | **-0.22** ** | *0.11* |
| Admission Based on Geography | 0.04 | *0.13* | 0.06 | *0.19* | 0.13 | *0.23* | -0.04 | *0.13* | 0.60 | *0.59* | **-0.53** ** | *0.24* |
| Student Infl on Course Selection (0-3) | 0.01 | *0.06* | **0.17** * | *0.10* | 0.15 | *0.11* | 0.08 | *0.07* | -0.25 | *0.21* | 0.10 | *0.15* |
| GED Confered by High School | -0.03 | *0.14* | -0.12 | *0.17* | -0.08 | *0.19* | **-0.34** *** | *0.11* | **0.90** ** | *0.35* | **0.48** ** | *0.21* |
| Constant | -0.20 | *0.91* | **-2.87** ** | *1.43* | **-4.15** *** | *1.39* | **1.67** * | *1.00* | -2.12 | *2.07* | -1.23 | *1.29* |

Notes:

1) Multinomial Logit regression. Estimates are relative to graduating high school in the general education field.

2)*,**,*** denote 90%, 95%, and 99% statistical significance respectively.

3) Standard Errors (SE) are clustered at the school level.

4) Total # Observations is 15,890.

likely to concentrate in trade vocational fields. Offering career pathways programs to students increases their likelihood of taking business vocational courses, while increasing the number of vocational teachers per student at a school increases the likelihood of taking trade vocational courses. As well, students who attend schools that confer GEDs on-site are more likely to pursue GEDs and are also slightly more likely to drop out of high school. Whether schools admit students based on geographic location has little effect on curriculum choice, with the exception that students are less likely to pursue GEDs or dropout. Finally, as students' influence on course selection

increases, students are more likely to take business vocational courses relative to general education courses and are less likely to pursue GEDs.

### E.2 PSE Attainment

Table E.2 provides the results of a first first-stage regression used to construct post-secondary education attainment predicted probabilities. The regression is a multinomial logit regression of PSE attainment on personal characteristics ($X_i$), local labor market characteristics ($M_i$), and high school instruments related to PSE attendance and PSE opportunities ($A_i$).

Table E.2: Selected PSE First Stage Estimates

| | 1-yr Trade School | | 2-yr CC | | 4-yr University | |
|---|---|---|---|---|---|---|
| Variable | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* |
| *1. Personal Characteristics* | | | | | | |
| Male | **-0.63** *** | *0.06* | **-0.47** *** | *0.07* | **-0.60** *** | *0.04* |
| Black | 0.07 | *0.10* | **-0.31** *** | *0.12* | 0.05 | *0.09* |
| Hispanic | **-0.21** ** | *0.10* | -0.14 | *0.11* | **-0.16** * | *0.09* |
| Other Race | -0.10 | *0.11* | **-0.21** * | *0.11* | **0.37** *** | *0.07* |
| Socio-Economic Status | 0.04 | *0.04* | **0.12** *** | *0.04* | **0.51** *** | *0.03* |
| Test Score | **-0.08** ** | *0.04* | **0.15** *** | *0.04* | **0.94** *** | *0.03* |
| Midwest | 0.04 | *0.10* | -0.01 | *0.11* | **-0.26** *** | *0.08* |
| South | 0.04 | *0.10* | **-0.19** * | *0.11* | **-0.24** *** | *0.08* |
| West | 0.10 | *0.11* | -0.16 | *0.14* | **-0.44** *** | *0.09* |
| Suburban | -0.02 | *0.08* | 0.04 | *0.09* | **-0.17** *** | *0.06* |
| Rural | -0.02 | *0.11* | 0.11 | *0.13* | **-0.18** ** | *0.09* |
| Catholic School | **0.31** ** | *0.15* | **0.29** * | *0.18* | **0.44** *** | *0.11* |
| Non-Catholic Private School | 0.18 | *0.15* | **0.42** ** | *0.17* | **0.41** *** | *0.11* |
| *2. Local Labor Market Characteristics* | | | | | | |
| Unemployment Rate | 2.56 | *2.20* | 0.43 | *2.58* | **7.44** *** | *2.10* |
| (ln) Average Hourly Wage | 0.40 | *0.21* | 0.12 | *0.28* | 0.10 | *0.19* |
| % Professional Employment | -1.95 | *1.86* | 0.86 | *1.95* | **3.63** ** | *1.46* |
| % Manual Labor Employment | 1.34 | *0.48* | 0.70 | *0.59* | 0.56 | *0.44* |
| % Non-Manual Labor Employment | 0.02 | *0.89* | 0.86 | *1.12* | 0.35 | *0.75* |
| *3. High School PSE Instruments* | | | | | | |
| % Students Attend College Fairs | -0.03 | *0.03* | 0.00 | *0.04* | 0.03 | *0.02* |
| % Students in College App Prog (0-5 Scale) | 0.01 | *0.03* | 0.01 | *0.03* | -0.02 | *0.02* |
| % Prev Students Enter Labor Market (0-5 Scale) | 0.00 | *0.05* | -0.03 | *0.06* | -0.05 | *0.04* |
| % Prev Students Attend 2yr College (0-5 Scale) | **0.13** *** | *0.05* | **0.16** *** | *0.05* | 0.03 | *0.03* |
| % Prev Students Attend 4yr College (0-5 Scale) | 0.02 | *0.04* | -0.09 | *0.06* | **0.12** *** | *0.04* |
| % Students Free/Reduced Price Lunch | -0.03 | 0.15 | -0.09 | 0.18 | **-0.29** * | 0.16 |
| % Students Take Academic Courses | -0.13 | *0.16* | 0.07 | *0.20* | **-0.28** ** | *0.14* |
| Admission Based on Geography | 0.03 | *0.13* | 0.07 | *0.13* | 0.10 | *0.08* |
| Student Infl on Course Selection (0-3) | -0.01 | *0.06* | **0.11** * | *0.06* | 0.07 | *0.04* |
| Constant | **-2.80** *** | *0.68* | **-2.18** ** | *0.91* | **-1.14** *** | *0.63* |

Notes:
1) Multinomial Logit regression. Estimates are relative to no PSE attainment.
2)*,**,*** denote 90%, 95%, and 99% statistical significance respectively.
3) Standard Errors (SE) are clustered at the school level.
4) Total # Observations is 13,250.

### F.1 Structural vs. Non-Structural Estimates

The structural model has several advantages over non-structural models. First, by estimating a structural model, I can separately identify the intertemporal effects of education and labor market choices – how each choice impacts present and future utility – and the mechanisms underlying those effects. For example, by estimating a structural model, I can identify whether a student takes high school vocational education courses because of the current period utility she derives, because of its effects on her future PSE institution utility, or because of its effects on her future wages in each occupation. By identifying these present and future effects of each choice, the parameter estimates of the dynamic discrete choice model provide more detail about the relationship between the explanatory and dependent variables and more context about what drives individual decision making.

Second, with a structural model I can jointly estimate effects that pertain to multiple, interrelated research questions. For example, by estimating a structural model, I can jointly estimate the effects of high school vocational education on wages in each occupation, the likelihood of being employed in a skilled occupation, the likelihood of graduating from high school, and the likelihood of graduating from a PSE institution, as opposed to estimating each of these effects separately.

Third, I can use the structural model to conduct policy simulations. It is worth noting that some policy simulations can be conducted using non-structural models. For example, the effects of increasing vocational high school opportunities nationwide could be simulated by adding vocational high school opportunities in the first stage of a 2SLS regression for every individual in the data set and seeing how the addition of these opportunities, for the subset of the sample that did not previously have access to them, would affect predicted values for aggregate wages and employment outcomes. For this simulation, the main benefit of the structural estimation approach is improved sample fit caused by accounting for forward-looking behavior and applying structure to the model (for examples of the general model fit and out-of-sample fit benefits provided by structural models, see Todd & Wolpin's (2006) model of Progressa, Duflo, Hanna & Ryan's (2011) model of teacher attendance decisions in India, and Kaboski & Townsend's (2011) model of microfinance programs in Thailand).

However, many policy simulations cannot be conducted without a structural model of forward-looking behavior. This class of simulations includes policy simulations that force

individuals down alternative choice paths, those that change the structure of the model in a substantive ways, and those that change the intertemporal effects of different choices (such as how decreasing the cost of community college would effect an individual's high school decisions). By estimating a structural model I can simulate the effects of these types of policies and predict how they would affect an individual's decisions throughout her lifetime.

**F.2 Structural Estimates**

Tables F.1, F.2, and F.3, display the 228 structural parameter estimates not provided in section 6.2. Table F.1 displays the omitted parameters related to the five occupation choices in the model. Table F.2 displays the omitted parameters related to the three PSE institution choices in the model. Table F.3 displays the omitted parameters related to the five high school field choices and the GED choice in the model.

## Table F.1: Additional Structural Occupation Parameters

| Variable | Professional Estimate | *SE* | Skilled Manual Labor Estimate | *SE* | Skilled Non-Manual Labor Estimate | *SE* | Skilled Other Estimate | *SE* | Unskilled Estimate | *SE* |
|---|---|---|---|---|---|---|---|---|---|---|
| *1. HS Curriculum & 1-yr Trade School Complementarity (Log-Wage Utility)* | | | | | | | | | | |
| Business Voc & 1-yr PSE | - | - | -0.01 | *(.028)* | -0.02 | *(.025)* | - | - | - | - |
| Trade Voc & 1-yr PSE | - | - | 0.05 * | *(.030)* | 0.11 *** | *(.039)* | - | - | - | - |
| *2. Local Labor Market Characteristics (Log-Wage Utility)* | | | | | | | | | | |
| Unemployment Rate | -0.12 | *(.274)* | 0.66 *** | *(.179)* | -0.62 *** | *(.212)* | 1.35 *** | *(.472)* | -1.40 *** | *(.309)* |
| (ln) Average Hourly Wage | 0.10 *** | *(.024)* | 0.03 * | *(.017)* | 0.13 *** | *(.020)* | -0.07 | *(.044)* | 0.11 *** | *(.032)* |
| % Professional Emp | 0.90 *** | *(.197)* | 0.59 *** | *(.141)* | -0.55 *** | *(.153)* | 0.52 | *(.342)* | -0.84 *** | *(.252)* |
| % Manual Labor Emp | 0.22 *** | *(.060)* | 0.25 *** | *(.044)* | -0.19 *** | *(.049)* | 0.07 | *(.100)* | -0.63 *** | *(.074)* |
| % Non-Manual Labor Emp | -0.07 | *(.104)* | -0.08 | *(.081)* | 0.44 *** | *(.087)* | 0.44 ** | *(.195)* | 0.11 | *(.138)* |
| *3. Personal Characteristics (Log-Wage Utility)* | | | | | | | | | | |
| Midwest | -0.10 *** | *(.016)* | -0.04 ** | *(.018)* | -0.04 ** | *(.017)* | -0.16 *** | *(.035)* | -0.03 | *(.029)* |
| South | -0.09 *** | *(.016)* | -0.05 *** | *(.018)* | -0.02 | *(.017)* | -0.10 *** | *(.033)* | -0.05 * | *(.027)* |
| West | -0.02 | *(.017)* | 0.04 | *(.019)* | 0.03 | *(.019)* | -0.20 *** | *(.041)* | -0.07 ** | *(.030)* |
| Suburban | 0.02 | *(.013)* | 0.05 *** | *(.014)* | -0.01 | *(.013)* | 0.02 | *(.028)* | 0.01 | *(.021)* |
| Rural | 0.01 | *(.017)* | 0.02 | *(.018)* | 0.02 | *(.018)* | -0.06 | *(.034)* | -0.07 ** | *(.027)* |
| Catholic School | 0.07 *** | *(.016)* | 0.11 *** | *(.024)* | 0.06 *** | *(.021)* | -0.04 | *(.038)* | -0.02 | *(.038)* |
| Non-Catholic Private Sch | 0.02 | *(.018)* | 0.03 | *(.024)* | 0.09 *** | *(.021)* | 0.09 ** | *(.037)* | 0.07 | *(.043)* |
| *4. Personal Characteristics (Non-Pecuniary Utility)* | | | | | | | | | | |
| Midwest | -0.01 | *(.028)* | 0.13 *** | *(.027)* | 0.06 * | *(.027)* | 0.11 * | *(.054)* | 0.10 ** | *(.047)* |
| South | -0.18 *** | *(.027)* | -0.03 | *(.026)* | -0.15 *** | *(.025)* | -0.07 | *(.051)* | 0.17 *** | *(.044)* |
| West | -0.22 *** | *(.031)* | -0.12 *** | *(.029)* | -0.13 *** | *(.029)* | 0.03 | *(.067)* | 0.18 *** | *(.051)* |
| Suburban | 0.05 * | *(.023)* | 0.13 *** | *(.021)* | 0.09 *** | *(.021)* | 0.09 ** | *(.044)* | 0.14 *** | *(.034)* |
| Rural | -0.01 | *(.029)* | 0.14 *** | *(.028)* | -0.01 | *(.027)* | 0.16 *** | *(.056)* | 0.11 ** | *(.047)* |
| Catholic School | 0.78 *** | *(.038)* | 0.22 *** | *(.037)* | 0.49 *** | *(.036)* | 0.95 *** | *(.065)* | 0.4 *** | *(.065)* |
| Non-Catholic Private Sch | -0.09 ** | *(.037)* | -0.20 *** | *(.039)* | -0.24 *** | *(.035)* | -0.09 | *(.060)* | -0.57 *** | *(.073)* |

Notes:

1) The parameter on log hourly wages (relating wage utility to non-pecuniary utility) is 1.37, with SE of *(.002)* .

2) The variance of the normal wage error terms is estimated to be 0.16, with a SE of *(.001)* .

4)*,**,*** denote 90%, 95%, and 99% statistical significance respectively.

5) Total # Observations is 16,200.

6) Standard errors (SE) are calculated using the covariance of the parameter estimate scores, following Train (2003).

## Table F.2: Additional PSE Education Structural Parameters

| Variable | 1-yr Trade School Estimate | | *SE* | 2-yr CC Estimate | | *SE* | 4-yr University Estimate | | *SE* |
|---|---|---|---|---|---|---|---|---|---|
| *1. PSE Instruments* | | | | | | | | | |
| % Prev Students Enter Labor Market (0-5 Scale) | -0.01 | | *(.043)* | -0.04 | * | *(.020)* | -0.18 | *** | *(.021)* |
| % Prev Students Attend 2yr College (0-5 Scale) | 0.10 | *** | *(.038)* | 0.18 | *** | *(.018)* | -0.16 | *** | *(.021)* |
| % Prev Students Attend 4yr College (0-5 Scale) | 0.05 | | *(.032)* | -0.11 | *** | *(.015)* | 0.51 | *** | *(.018)* |
| % Students Attend College Fairs | -0.04 | | *(.031)* | 0.01 | | *(.014)* | 0.03 | | *(.016)* |
| % Students in College App Prog (0-5 Scale) | 0.01 | | *(.027)* | 0.04 | *** | *(.012)* | 0.18 | *** | *(.014)* |
| *2. Personal Characteristics* | | | | | | | | | |
| Midwest | 0.11 | | *(.106)* | -0.09 | * | *(.048)* | -0.90 | *** | *(.054)* |
| South | 0.11 | | *(.101)* | -0.17 | *** | *(.046)* | -0.68 | *** | *(.051)* |
| West | 0.09 | | *(.114)* | -0.08 | | *(.052)* | -0.92 | *** | *(.058)* |
| Suburban | -0.04 | | *(.077)* | 0.10 | *** | *(.037)* | -0.74 | *** | *(.038)* |
| Rural | -0.07 | | *(.102)* | -0.01 | | *(.049)* | -0.91 | *** | *(.049)* |
| Catholic School | 0.26 | * | *(.132)* | 0.75 | *** | *(.060)* | 2.71 | *** | *(.080)* |
| Non-Catholic Private School | 0.01 | | *(.134)* | 0.04 | | *(.060)* | 1.29 | *** | *(.082)* |
| Male | -0.82 | *** | *(.106)* | | | | | | |
| Black | 0.54 | *** | *(.104)* | | | | | | |
| Hispanic | -0.03 | | *(.103)* | | | | | | |
| Other Race | -0.01 | | *(.104)* | | | | | | |
| Socio-Economic Status | 0.17 | *** | *(.045)* | | | | | | |
| Testscore | 0.13 | ** | *(.055)* | | | | | | |
| Constant | -2.67 | *** | *(.304)* | | | | | | |
| *3. Previous Education* | | | | | | | | | |
| Academic | -0.43 | *** | *(.119)* | | | | | | |
| Business Vocational | -0.12 | | *(.315)* | | | | | | |
| Trade Vocational | -1.31 | *** | *(.542)* | | | | | | |
| Other Curriculum | 0.20 | ** | *(.098)* | | | | | | |
| GED | 0.19 | | *(.157)* | | | | | | |

Notes:

2) *,**,*** denote 90%, 95%, and 99% statistical significance respectively.

3) Total # Observations is 16,200.

4) Standard errors (SE) are calculated using the covariance of the parameter estimate scores, following Train (2003).

## Table F.3: Additional HS Education Structural Parameters

| | Academic | | General Ed | | Business Voc | | Trade Voc | | Other | | GED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* | Estimate | *SE* |
| *1. HS Education Instruments* | | | | | | | | | | | | |
| # Voc Teachers per 100 Students | - | - | - | - | -0.01 | *(.144)* | -0.02 | *(.144)* | -0.02 | *(.094)* | - | - |
| % Stu Free / Reduced Price Lunch | 0.12 | *(.116)* | -0.28 *** | *(.084)* | -0.01 | *(.149)* | -0.02 | *(.148)* | -0.23 ** | *(.110)* | -0.44 *** | *(.151)* |
| Admission Based on Geography | 7.01 *** | *(.110)* | 6.86 *** | *(.101)* | 6.88 *** | *(.129)* | 6.76 *** | *(.124)* | 6.74 *** | *(.110)* | 8.09 *** | *(.258)* |
| Stu Infl on Course Selection (0-3 Scale) | 1.77 *** | *(.053)* | 1.8 *** | *(.050)* | 1.83 *** | *(.060)* | 1.80 *** | *(.061)* | 1.87 *** | *(.053)* | 1.81 *** | *(.118)* |
| % Prev Stu Enter Labor Market (0-5 Scale) | 2.75 *** | *(.053)* | 2.77 *** | *(.050)* | 2.90 *** | *(.058)* | 2.79 *** | *(.057)* | 2.77 *** | *(.052)* | 2.62 *** | *(.119)* |
| % Prev Stu Attend 4yr Col (0-5 Scale) | -1.45 *** | *(.055)* | -1.46 *** | *(.053)* | -1.40 *** | *(.061)* | -1.41 *** | *(.059)* | -1.42 *** | *(.055)* | -1.66 *** | *(.124)* |
| % Prev Stu Attend 2yr Col (0-5 Scale) | 4.35 *** | *(.042)* | 4.31 *** | *(.040)* | 4.33 *** | *(.047)* | 4.29 *** | *(.046)* | 4.30 *** | *(.042)* | 4.08 *** | *(.092)* |
| *2. Personal Characteristics* | | | | | | | | | | | | |
| Midwest | -0.11 | *(.092)* | 0.29 *** | *(.080)* | 0.23 * | *(.117)* | 0.06 | *(.111)* | 0.49 *** | *(.096)* | 0.35 ** | *(.138)* |
| South | -0.17 * | *(.082)* | -0.27 *** | *(.072)* | 0.04 | *(.111)* | -0.67 *** | *(.104)* | -0.18 * | *(.090)* | -0.03 | *(.126)* |
| West | 0.47 *** | *(.097)* | 0.89 *** | *(.084)* | 0.13 | *(.143)* | -0.02 | *(.129)* | 0.85 *** | *(.102)* | 0.57 *** | *(.152)* |
| Suburban | 0.05 | *(.071)* | 0.35 *** | *(.062)* | 0.54 *** | *(.092)* | 0.61 *** | *(.093)* | 0.52 *** | *(.073)* | 0.59 *** | *(.105)* |
| Rural | -0.42 *** | *(.100)* | -0.05 | *(.088)* | 0.19 | *(.118)* | 0.08 | *(.121)* | 0.24 ** | *(.099)* | 0.15 | *(.140)* |
| Catholic School | 14.81 *** | *(.224)* | 15.29 *** | *(.218)* | 15.64 *** | *(.263)* | 13.82 *** | *(.294)* | 13.48 *** | *(.251)* | 14.74 *** | *(.454)* |
| Non-Catholic Private School | 3.67 *** | *(.111)* | 4.65 *** | *(.089)* | 4.19 *** | *(.197)* | 2.95 *** | *(.263)* | 3.12 *** | *(.151)* | 5.27 *** | *(.157)* |

Notes:

1)*,**,*** denote 90%, 95%, and 99% statistical significance respectively.

2) Total # Observations is 16,200.

3) Standard errors (SE) are calculated using the covariance of the parameter estimate scores, following Train (2003).

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