An Investigation into Active Service on Veteran's Wages

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Abstract

Studies on veterans in the civilian market is not a new subject. However, many advances have been made in both politics and society in order to aid in veterans' reintroduction into society. This paper reviews previous literature in order to identify pitfalls in the analysis of veterans' and their wages. Being aware of these pitfalls, a strategy is formulated and then executed in order to analyze the effect that active military service has on service member's finical well-being once they are reintegrated back into society.

Introduction

Throughout human history, one tragic reality that follows civilization after civilization is the concept of war. Very few, if any, countries have escaped armed combat in some form. Switzerland and Sweden are two countries who are well known for their neutrality within the last 200 years, however, even these countries have armed forces. The United States is no exception. Veterans who have served in an active military role face many challenges when transitioning back into a civilian lifestyle. These can take on a variety of different faces, but a primary one is integrating back into the workforce. In this paper, we will look at the effect of being in the United States Armed Forces on veteran's wages within the civilian workforce. This will allow us to answer the question, "Does serving in an active military role provide the experience required to be comparable to civilian workers in the civilian job market?"

This is an intriguing question. No one would likely say that someone serving in an active military role has no experience. However, the experience they receive is of a vastly different style than someone in the civilian job market. In many cases, the extreme pressures and circumstances that service men and women are placed under have adverse effects to both their physical and mental well-being. These effects have the potential to affect the productivity, and thus the competitive edge, that veterans put forward into the work force. On the other hand, veterans have undergone a distinctively unique experience that few non-veterans can compare too. Thus, the heart of our question lies in this competing effect.

A common and classical way to predict someone's return to schooling is with a Mincer equation. This utilizes the subject's education and experience level in order to predict their income. We will be utilizing this as our basis in the following models. In addition to looking at the impact of general active service on income, we will also look at two other factors.

The first of these two is a more detailed investigation of service members in regard to the era of service. We will divide our observations into time frames of active service primarily centered around major wars. This should give a more detailed look at the impact that each war had on these men and women.

Relatively recently, a new offering has been present among service men and women who are transitioning back into civilian life. This program is referred to as the Military Transition Assistance Program (TAP), which was established in 1991 by Congress as a part of the National Defense Authorization Act. This program was designed in order to ease the transition of military service members into a civilian lifestyle. Our second model will look at the potential impact this program has on service members household income.

We will find that there is an overall increase in service men and women's civilian wages attributed to their time in service. This increase is both significant and consistently positive across all three years of data we are investigating. Also, veterans who have served most recently are consistently earning higher wages as a direct result from their time in service. This would indicate that something has changed within the military in the last few decades that would increase service men and women's wages out of the military. There is a distinct possibility that programs such as TAP play a key role in this effect. Finally, while the results are less than ideal, we do see a positive effect of TAP on service members civilian wages in 2005. This is not substantiated in the 2001 and 2003 data sets.

Naturally, this paper is broken up into six distinct sections. Firstly, we will cover several relevant papers that closely relate to the topic at hand. These papers are informative on several considerations that we will have to make when

interpreting the results. Secondly, the data will be covered in detail, and several limitations and considerations will be pointed out. Thirdly, we will define the three models that will be utilized in the analysis. After this, the results and our assumption checks will be laid out each in their own sections. Finally, we will conclude with a short summary and ideas for future research opportunities.

Literature Review

The topic that is military service's effect on civilian labor market wages is an extensive one. For this reason, the methodology of analyzing such data has also remained fairly consistent. Much of the current literature follows the studies and models that were originally developed to deal with returns to schooling, the Mincer equation being a prime example. However, a great portion of this work was completed before the 2000's, and much work has been done since then to ensure that a veteran's transition into a civilian life is seamless as possible. For this reason, we will be continuing the topic of veteran wages using current data sets.

Much of the methodology within this paper will parallel previously proven methods, such as the human capital model put forward by Mincer (1974). However, some minor additions will be made in order to achieve more pertinent result. The data source that many studies use the Current Population Survey (CPS). This expansive and well-known data set houses many relevant variables, but as brought up in Hirsch and Mehay (2003), it has limitation in veteran specific information. For this reason, one difference of this paper is the use of the CPS data accompanied by three surveys that were distributed alongside several more recent CPS surveys. This allows for individual service history in addition to the general labor market questions traditionally housed in the CPS data sets.

Unlike Hirsch and Mehay (2003), who utilize surveys conducted in 1986 and 1992, and many other papers, we will be utilizing data from 2001, 2003, and 2005. This is essential since many changes to the process of transitioning to civilian life for veterans have changed. One such change is the aforementioned Military Transition Assistance Program started in 1991. Much of the previously study data was collected before or too soon after the inception of TAP for it to be a factor.

One area of warning that we must be cognizant of, especially because of the years of data we have chosen to use, is the main topic of a paper by Dávila and Mora (2012). They discuss in their paper the effects of terrorism on veteran's wages. Specifically, they analyze the collective change in attitude that swept the

nation after the tragic terrorist attacks that were carried out on September 11, 2001. Using a Blinder-Oaxaca decomposition, they found a significant increase in the short-term to veterans' relative earnings. However, this was not evenly distributed when race was considered.

All in all, we will use many of the same ideas as previously pioneered work. However, we will make an effort to generalize and modernize this field of research through the slight variations we make from past analysis. In so doing, we hope to add to the overall body of work.

Data

The data that we will be utilizing is a data set found on the website of the Inter-university Consortium for Political and Social Research (ICPSR). It is comprised of the 2001 August CPS alongside two survey questionnaires and a biennial survey on veterans. This gives us both the benefits of the CPS while also giving more detailed information about the veterans within, all pooled together in a rather expansive and large data set. In addition to this set from 2001, we will be utilizing the sets from 2003 and 2005 as well.

Within the data set, we will be utilizing several different variables. Firstly, we will use the standard household income data as our dependent variable. Unfortunately, we start off with a limitation as this variable is broken up categorically in an effort to keep the individuals anonymous. This limits our interpretation of the data to generalized moves up and down a hierarchical ladder. Even though we are unable to put concrete numbers to this movement, the overall goal of this paper is unhindered. We are primarily looking at if there is a benefit or detriment to active service on wages. This can still be done with a categorical dependent variable.

In addition to income, we will also utilize an education variable. Education is measured by the highest degree achieved. Thus, these include no high school, high school, associates, bachelors, masters or professional, and doctorate degrees. In an effort of transparency, it would have been preferred to have a measure of how many years of schooling the person underwent instead of the degree achieved. Being that many veterans will have been out of school for quite a while upon leaving the military, a more traditional human capital approach seems more ideal. However, our data is once again broken up categorically, forcing us to take a signaling approach to education.

To accompany education, we will employ age as our market experience variable. Also, since we know wage gaps and location heterogeneity are prevalent,

we will include demographic and industry fixed effects. Lastly, we will initially include an active service indicator that will tell us if a particular observation was ever on active duty. This will later be traded out for a diverse set of factors that indicate era, if any, of service.

In order to avoid problems and focus on the question at hand, we limited our data to adults who are not currently in an active military role. A potential problem that we may face, is the effect of 9/11 since we are utilizing data around this event. This has the potential to introduce upward basis in our 2003 and 2005 data sets. However, since this patriotic boost to veteran's wage was not universal to all veterans, as found by Dávila and Mora (2012), this effect should be minimal.

Empirical Method

The method we shall use is based in the classical Mincer equation, a human capital model. In this, we use the theory that adding to one's supply of human capital will increase their wages. The two primary ways this happens is through additional years of education and experience in the workplace. Since we are predicting income, we will use this as our base equation.

In addition to our two main human capital variables, we will use various controls in order to assure differences in wages attributed to gender or race are fixed. These are unexplained gaps in wages between two individuals who may have the same education and experience yet have different wages regardless. Similarly, we will include regional controls since different regions have heterogeneous medians of pay. Finally, we will include a retirement control. We need to keep those who are unemployed within the sample since we are looking at viable income changes in regard to human capital. Those who are unemployed may be unemployed due to their level of human capital. However, those who leave the workforce by choice, whether for age or injury, elect to take a lower wage and thus we must account for this difference.

Last but not least, we will include our variable of interest, active service. Theoretically, this should be an extension of our human capital variables. There are three possibilities when it comes to analyzing this coefficient. Firstly, if the coefficient is zero, insignificant, this would indicate that there is no statistical significance between active military service and those who have only been in a civilian role. Secondly, if the coefficient is negative, this would mean that across the board there is a lack of necessary and relevant human capital accumulation as a result of active service. This could also indicate that the majority of veterans have a detri-

mental experience while serving that could harm their viability in the workforce. Lastly, if the coefficient is positive, veterans do better in the workforce as a result of their service. This could be because of the unique experiences that veterans undergo while in service.

The equation we will be working with is defined as follows:

$$Y_i = \beta_0 + \beta_1 Educ_i + \beta_2 Exp_i + \beta_3 ActEver_i + X_i + \mu_i + \rho_i + \epsilon_i \qquad (1)$$

The Y_i is our dependent variable that indicates our level of household income. $Educ_i$ and Exp_i will indicate individual i's level of human capital. The variable of interest, $ActEver_i$, indicates if individual i has ever served in an active military role. In addition, this will later be broken up into a set of dummy variables that will control for the era of service if they were active military. Next, μ_i and ρ_i are demographic and industry fixed effects respectively. Note, ρ_i includes both an in or out of industry indicator along with a location of industry indicator. Finally, ϵ_i is our individual i's error term.

The primary problem we will most likely have to address with this model is heteroskedasticity. Since there are no time dependent variables, we will not have to deal with serial correlation. Also, it is unlikely that any measurement error was introduced since education is measured in degrees attained and not number of years. All other variables such as age, service, and demographics are unlikely to suffer from significant measurement error. Finally, only two variables have the possibility to suffer from multicollinearity, those being education and potential experience, derived from age. This is unlikely but we should check regardless. More specifics on tests used and their results will be discussed in the future Assumptions section. Note, however, that all standard errors in tables are robust in order to correct for the model's heteroskedasticity.

Results

Table 1 shows us our initial look into the effect of active service on wages. We have included a basic human capital model along with select control variables that were exclude from the in-text table. The full table is included in the appendix. Notice that much of what we would expect is displayed within the model. These include the well documented gender and race pay gaps and reasonable returns to education.

A noteworthy observation is the experience variable. It is significant in all cases, but negative. This unusual phenomenon is consistent through-out this and most models here on out. History and common sense would indicate that this sign should be positive by all accounts. One explanation for such a phenomenon is how the experience variable was constructed. Ultimately, this variable originated from the data set as an age variable, and it may be fairer to refer to it as potential experience for each observation. It is a linear transformation that measures the time since entering adulthood. Noting this, if we look at our data sets, we see that roughly 30 percent are retired for one reason or another. Customarily, retirement substantially docks one's pay. For this reason, we endeavored to control for it. However, retirement is neither forced nor guaranteed and thus there may be many who have chosen to move to lower paying, more flexible jobs in their later years. This could skew the results and is indeed the most likely cause.

Table 1: Active Service (Small)

	(2001) Income	(2003) Income	(2005) Income
exp	-0.00953***	-0.00417***	-0.00475***
	(0.000816)	(0.000845)	(0.000877)
educ	1.049***	1.018***	1.146***
	(0.00863)	(0.00888)	(0.00965)
female	-0.127***	-0.114***	-0.151***
	(0.0242)	(0.0245)	(0.0263)
actever	0.448***	0.378***	0.257***
	(0.0350)	(0.0367)	(0.0398)
retire	-1.684***	-1.784***	-1.817***
	(0.0305)	(0.0309)	(0.0328)
_cons	9.350***	9.365***	9.679***
	(0.0362)	(0.0366)	(0.0391)
N	87996	84547	84496
adj. R^2	0.225	0.221	0.226

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

By running the same regression but limiting our data set to only typical working aged adults, experience does indeed become positive. However, for the very

same reason we are getting negative basis in our experience variable, we do not want to remove these observations. This is because we would like to look at the effect of service over the entire life of a veteran's civilian pay. If we would remove these observations, simply because those later in their life chose a more flexible, lower paying job, we would be limiting our main interpretation for a secondary coefficient.

Looking at our main result in Table 1, on the whole, we see that active service does affect the overall civilian pay of veterans. In fact, it is a positive relationship, though seemingly diminishing over time. Because of the categorical nature of our dependent variable, we are unable to attach meaningful numeric results. However, we can still look at general trends across the years. Notice then that all three years exhibit significance in their results. This would indicate that the unique experience that active service members lived through has a notable impact on their pay after they leave the military.

This can be further broken down if we look at the era of service. In Table 2, we can see exactly that. Unfortunately, results are far from consistent. All four service eras are in contrast to non-veteran income. The 'other' era indicates a service period that took place after the Vietnam war. This is the set of results we want to pay particularly close attention to. Vietnam and Korean war veterans have positive coefficients, but they range quite drastically in value and significance. Those veterans from World War 2 have the same issue, and also exhibit a sign reversal in 2005. However, those who have served most recently have consistently positive and significant coefficients across all three years of data. As mentioned before, great strides have been taken in recent decades to smooth out the transition of veterans to civilian life. This could be a reasonable explanation for why those who have been in active service most recently are more consistently earning higher wages due to their service time.

Finally, we want to look at the logical conclusion to all of this. The Military Transition Assistance Program aims to help veterans transition back into a civilian lifestyle. The program has many useful tools for veterans, some of which are workshops to help in the transition back into the workforce through such things as resume and interview classes. We wish to be clear here in saying that the results and discussion that follow are not an indication of the validity of TAP, whether positive or negative. The program reaches and helps with far more than just veterans monetary concerns. Also, the program that was start in 1991 was quite simply in its infancy. It has since gone through a couple major changes and a complete redesign in 2011.

This being said, let us discuss the results now. We will focus on the 2005 data

set primarily. This is because it is the latest data set since the inception of TAP. However, we will briefly mention the others as well as to not neglect or cover up their results. As an added bonus, the 2005 data also has the largest number of observations out of the three. We will add a dummy variable to our regression that will indicate whether or not the observation was in attendance at one of the TAP workshops.

Table 2: Era of Service

	(2001) Income	(2003) Income3	(2005) Income
exp	-0.00856***	-0.00337***	-0.00370***
	(0.000834)	(0.000861)	(0.000858)
retire	-1.645***	-1.752***	-1.805***
	(0.0311)	(0.0314)	(0.0329)
educ	1.048***	1.017***	1.147***
	(0.00863)	(0.00887)	(0.00965)
female	-0.141***	-0.125***	-0.180***
	(0.0243)	(0.0246)	(0.0250)
vietnam	0.779***	0.636***	0.298
	(0.0518)	(0.0541)	(0.178)
korean	0.175*	0.0929	0.333***
	(0.0836)	(0.0865)	(0.0973)
ww2	-0.179*	-0.151	0.366***
	(0.0772)	(0.0815)	(0.0795)
other	0.474***	0.419***	0.202*
	(0.0520)	(0.0550)	(0.0938)
_cons	9.324***	9.342***	9.673***
	(0.0364)	(0.0368)	(0.0393)
N	87996	84547	84496
adj. R^2	0.226	0.221	0.226

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 shows us the usual cases of positive experience and education coefficients, both of which are significant. Also, notice that within this data, our

coefficient of interest, transwshop, is both positive and significant. Thus in 2005, veterans were earning a substantial amount more per year if they had attended a TAP workshop in the past. Unfortunately, the same cannot be said for the other two data sets. Both coefficients from 2001 and 2003 are insignificant. All three tables are included in the appendix for viewing.

Assumption Checks

As discussed in the Empirical Methods section, there are a couple tests we must run in order to verify that our solution satisfies our assumptions. We have two primary concerns with our data. First and foremost, we must account for the very likely possibility of heteroskedasticity. Secondly, in order to be thorough, we should check for multicollinearity. Both autoregression and simultaneity should not be an issue within this sample. We can assume that there is no autorgression issues because we are not dealing with observations over time. In terms of simultaneity, we are dealing with variables that do not change at the same time with one another. There is also no precedent among similar models and studies for simultaneity.

First, let us look at multicollinearity. The most straight forward and easiest way to check is through the variance inflation factors, but a matrix table will be included in the appendix as well. The highest variance inflation factor in the group tops out at 1.61, well below the advisable limit. This, along with our large data sample and no discernible patterns within our matrix graph, gives confirmation that there is no multicollinearity between any of our variables.

Next, is the big culprit, heteroskedasticity. For this, we checked two tests that gave a decisive answer. Running the Breusch-Pagan test for heteroskedasticity, we find a chi squared value of 1759.74. With this large of a test statistic, we hardly even need to check any other test before concluding that the sample does suffer from heteroskeasticity. Even so, we ran White's test and found a chi squared value of 3058.75. Thus, we can safely say that we have heteroskedasiticty within the data. This is not surprising as our data is from the CPS where observations are taken from across the country. Therefore, as mentioned before, all standard errors that are reported within this paper are robust in order to combat the heteroskeasticity.

Conclusion

This paper analyzed CPS data in conjunction with a survey distributed to veterans in order to investigate the impact of active service on veterans' wages and compare that to non-veteran experience. This paper hopes to bring light in a more general way using recent data in order to observe the progress across our five years of data.

We found that there is in fact a statistically significant increase in veteran's civilian wages as a result of their active service. In addition, we saw the same positive trend and significance across all three years of data. As a warning from the literature, we had to be careful when comparing the 2001 data to those that came after due to an upward basis caused by increased 'patriotism' after the 9-11 terrorist attacks. However, we did not observe this in the data as there was a steady decline from 2001 all the way to 2005.

The models also showed that programs like TAP have an impact of steadying and improving veterans' civilian life, at least financially. This conclusion is not as concrete as our main finding, but there is evidence that those who have served most recently and had access to TAP are better off than those who served in the mid 1900's and did not have access to TAP.

One area that future research can expand this topic is in the exploration of the true effects of TAP and similar programs. We showed here that there is likely a positive correlation. However, making these results more conclusive and reaching a broader topic than just financial well-being is an area for improvement. Also, doing a similar study to look at military service's effect on veterans from other countries would be equally intriguing.

Honoring veterans' and their legacy should be very important, no matter what nation. For this reason, we should not cease our research in an attempt to give back just a part of what they sacrificed in order to protect their country. Continuing and improving programs such as TAP in order to smooth the transition back into a civilian life so that veterans can live a normal life with their families and friends should be a high priority. This should include insuring that changes made to these programs are in the interest of making a real change and improvement in service members' lives. In this way, we can give back as a data analyzing community and show appreciation for their sacrifices.

References and Appendix

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Table 1: Active Service (Full)

	(2001) Income	(2003) Income	(2005) Income
exp	-0.00953***	-0.00417***	-0.00475***
	(0.000816)	(0.000845)	(0.000877)
educ	1.049***	1.018***	1.146***
	(0.00863)	(0.00888)	(0.00965)
female	-0.127***	-0.114***	-0.151***
	(0.0242)	(0.0245)	(0.0263)
black	-1.430***	-1.489***	-1.672***
	(0.0423)	(0.0444)	(0.0478)
amind	-1.522***	-1.882***	-2.055***
	(0.107)	(0.136)	(0.121)
aspac	-0.0391	-0.0387	-0.00837
	(0.0599)	(0.0679)	(0.0701)
actever	0.448***	0.378***	0.257***
	(0.0350)	(0.0367)	(0.0398)
neast	0.291***	0.285***	0.152***
	(0.0328)	(0.0331)	(0.0361)
midwest	0.0443	-0.0526	-0.273***
	(0.0316)	(0.0321)	(0.0348)
south	-0.153***	-0.166***	-0.234***
	(0.0316)	(0.0320)	(0.0336)
retire	-1.684***	-1.784***	-1.817***
	(0.0305)	(0.0309)	(0.0328)
_cons	9.350***	9.365***	9.679***
	(0.0362)	(0.0366)	(0.0391)
N	87996	84547	84496
adj. R^2	0.225	0.221	0.226

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Transitional Workshop 2001

	(1) Income 2001
exp	0.0475***
	(0.0106)
retire	-1.470***
	(0.390)
educ	0.624***
	(0.0900)
female	-0.180
	(0.294)
black	-0.525
	(0.269)
amind	-1.060
	(0.704)
aspac	0.260
	(0.601)
transwshop	0.151
	(0.171)
neast	0.296
	(0.271)
midwest	0.0493
	(0.240)
south	0.269
	(0.226)
_cons	8.995***
	(0.282)
N	1090
adj. R^2	0.115

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Transitional Workshop 2003

	(1)
	Income 2003
exp	0.0517***
	(0.00866)
retire	-2.113***
	(0.359)
educ	0.731***
	(0.0760)
female	-0.251
	(0.259)
black	-0.331
	(0.286)
amind	-2.983**
	(1.005)
aspac	-0.955
	(0.832)
transwshop	-0.00406
	(0.170)
neast	0.704**
	(0.258)
midwest	-0.444
	(0.252)
south	0.0760
	(0.211)
_cons	9.052***
	(0.260)
N	1106
adj. R^2	0.174

Standard errors in parentheses

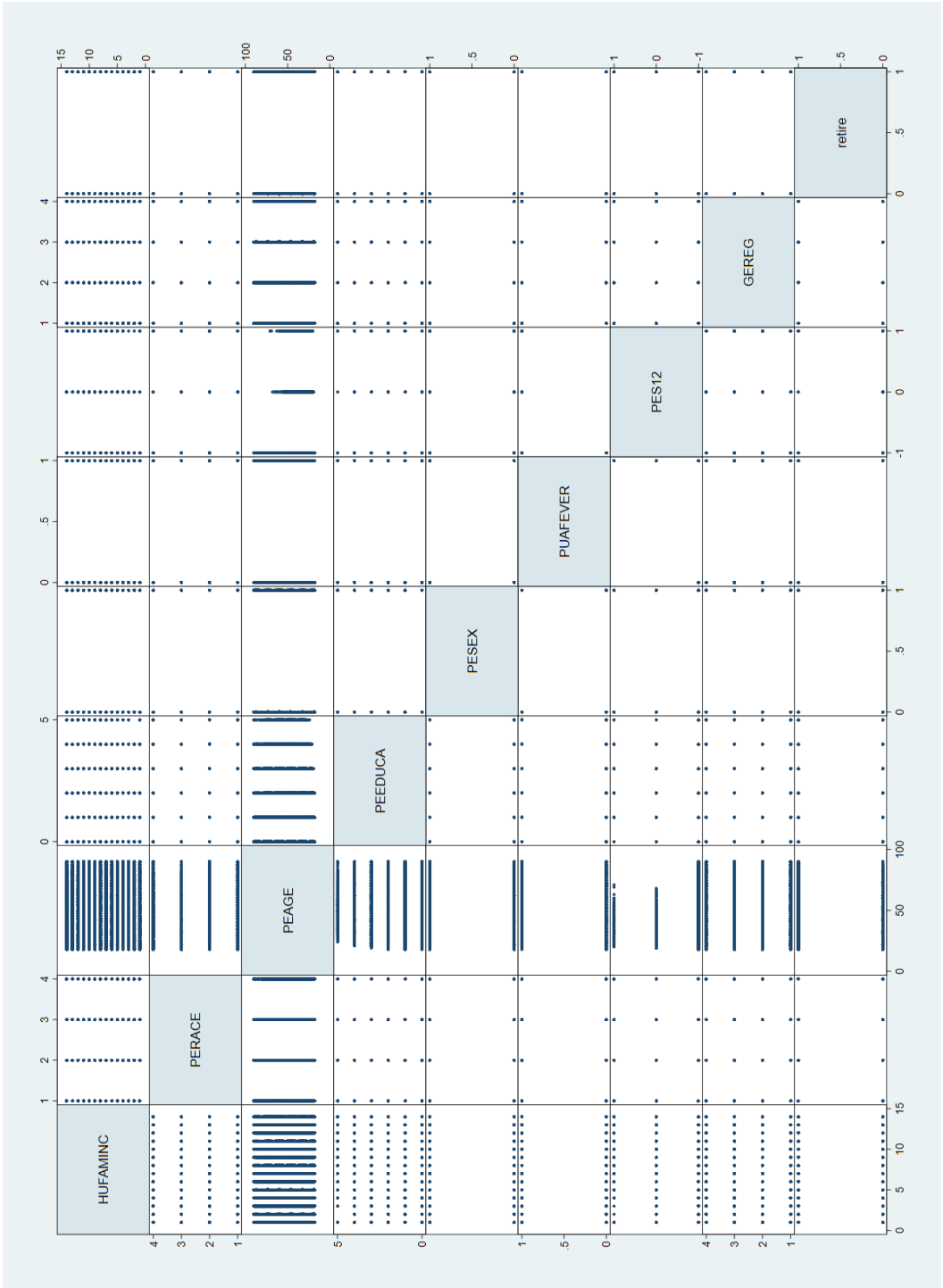
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Transitional Workshop 2005

	(1)
	Income 2005
exp	0.0493***
	(0.00881)
retire	-2.061***
	(0.361)
educ	0.770***
	(0.0786)
female	-0.209
	(0.289)
black	-0.643*
	(0.293)
amind	-2.493**
	(0.811)
aspac	-1.978
	(1.219)
transwshop	0.419*
	(0.168)
neast	-0.482
	(0.293)
midwest	-0.706**
	(0.247)
south	-0.380
	(0.212)
_cons	9.611***
	(0.284)
N	1290
adj. R^2	0.167

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$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