

**Master of Liberal Arts 60643**  
**Economic Controversies**  
The Harvey Test

Economics is accused, and rightly so in many instances, of being overly concerned with theory and showing little interest in studying the real world. My school of thought is especially concerned with this. For that reason, I'd like you to test some of the theories we discuss in class. What fun!!!

First off, if you were to really try testing theory using data, you'd need to have taken statistics and then do multivariate regression analyses. Let's not. How about something very simple and intuitive: The Harvey Test! I made this up some years ago in the Intro Macro course as a quick and easy way to get a handle on how well the data match the theories. **BE FOREWARNED!** Because it is so simple, it's hardly a conclusive method (on the other hand, neither is multivariate regression analysis). But it will give you a chance to look at some real-life numbers and it will keep you off the streets for a while.

Here is how it works.

**STEP ONE:** Consider the theory you have been asked to test in comparison to the data provided. If the theory is correct, should the numbers move together or in the opposite direction? For example, let's say we have numbers on a student's grades and the number of hours she studied (over a dozen quizzes in the same course). Given what we all assume is true, should her grade rise or fall as she studies more? Rise, of course. That's step one:

*Figure out how the series of numbers should be related IF the theory is true.*

This is often expressed in this manner:

$$(1) \quad X = f(Y) \\ \quad \quad \quad ?$$

This says, "X is a function of Y," or, "Y causes X." The ? would be replaced by a plus sign or a minus sign, depending on the relationship. If X moved in the same direction as Y, it would be plus; if X moved in the opposite direction, it would be minus. It is important to note that plus doesn't mean bigger and minus smaller! For example:

$$(2) \quad \text{Grade} = f(\text{Hours of Study}) \\ \quad \quad \quad +$$

If Hours of Study rises, so does Grade; but, if Hours of Study falls, then Grade does, too.

**STEP TWO:** Arrange the data in chronological order (actually, I'll give it to you that way) and determine (for each column separately) whether the number rose or fell from observation to observation. You should end up with something like the below chart (notice that you always lose one observation by doing this—we start with 12 below but end up with 11, because we are looking at the changes from one to the next):

TABLE ONE: Changes in Each Column.

Quiz	Grade	$\Delta$ Grade	Hours Study	$\Delta$ Hours
#1	90	-----	5	-----
#2	85	DOWN	4	DOWN
#3	80	DOWN	4	NC
#4	95	UP	6	UP
#5	75	DOWN	5	DOWN
#6	100	UP	6	UP
#7	65	DOWN	2	DOWN
#8	85	UP	4	UP
#9	85	NC	4	NC
#10	90	UP	3	DOWN
#11	95	UP	5	UP
#12	95	NC	6	UP

On the chart, each DOWN means the number fell from the last observation, UP means it rose, and NC means it did not change at all. We cannot enter anything for quiz #1 since there wasn't one before it. *Note that at this stage, you are thinking only about one column at a time—don't worry about how grades are comparing with hours of study just yet.*

**STEP THREE:** Recall your hypothesis from Step One (minor technical note: since this is the same as the previous equation, it is given the same number):

$$(2) \quad \text{Grade} = f(\text{Hours of Study})$$

+

It said that the two columns should move together. If the theory is correct, each time you get a UP for hours of study, you should get the same thing (UP) for grade. Likewise, each DOWN should be met by a DOWN, and each NC by an NC. You might want to add a new column as I did below and then mark whether or not the theory was supported.

TABLE TWO: Testing the Theory.

Quiz	Grade	$\Delta$ Grade	Hours Study	$\Delta$ Hours	Theory Supported?
#1	90	-----	5	-----	-----
#2	85	DOWN	4	DOWN	YES!
#3	80	DOWN	4	NC	no
#4	95	UP	6	UP	YES!
#5	75	DOWN	5	DOWN	YES!
#6	100	UP	6	UP	YES!
#7	65	DOWN	2	DOWN	YES!
#8	85	UP	4	UP	YES!
#9	85	NC	4	NC	YES!
#10	90	UP	3	DOWN	no
#11	95	UP	5	UP	YES!
#12	95	NC	6	UP	no

**STEP FOUR:** Count up how many times you got what your hypothesis predicted (marked by a “YES!” in the table above). You should get 8. Now add up the misses (marked by “no” above): 3 ( $8 + 3 = 11$ , or the total number). Find out the percentage that supported the theory by dividing the number that fit by the total:  $8/11 = 72.7\%$ . Locate that percentage on the chart below and declare your findings!

Test Success Rating	Percent found to fit theory
A	100% to 90%
B	89.9% to 80%
C	79.9% to 70%
D	69.9% to 60%
F	< 60%

In this case we would assign a “C.” It passed. It wasn’t spectacular, but there does appear to be the hypothesized relationship between the two columns. Hooray!

**ADDITIONAL NOTES:** On the homeworks that require a Harvey Test, be sure to include the following:

1. The original theory or theories you were testing in the form shown in equation (2).
2. Table with the raw data and “UP,” “DOWN,” or “NC” (or some equivalent) next to each relevant observation (see TABLE ONE for an example).
3. Table with a column like the last in TABLE TWO, showing the number of times the hypothesized relationship was supported by the data. Note that this can be combined with the above so that it is all on one table.
4. The raw percentage of times that the theory was supported (in the above example, 72.7%).
5. The grade this would earn (in the above example, a C).
6. A sentence or two on whether or not this seems to support the theory. Basically, as you can imagine, an A or B is pretty good, C is passable, D is questionable, and F is, well, F! That is so because if you have less than 60%, then it’s pretty close to just a random correlation (i.e., just 50-50). Note, too, that if you get a really low percentage, then you have passed into the range where the data are suggesting is that the OPPOSITE of your hypothesis is true! For example, if in the above we had only 9% support, that’s really worse than just an F because it means that it would have been 91% support for more studying leading to lower grades. That will come up a couple of times during the semester and it is worth mentioning.

You are absolutely welcome to do all this on a spreadsheet program. I don’t use Excel so I can’t be of much help with the formulas, but basically you have a column of IF-THEN where you put UP for a bigger number and DOWN for a smaller (or something like that—you could do 1 and 0, or 1 and -1, or anything--note that you’ll never actually get an NC on the homework). This would take care of STEP TWO. To do STEP THREE, you’d add a new column that compared the two columns you created in step two. I always do an IF-THEN statement wherein if the relationship was expected to be positive, whenever the two columns are the same (UP and UP or DOWN and DOWN), it generates a 1; otherwise a 0. If the relationship was expected to be negative, whenever the two columns are the same (UP and UP or DOWN and DOWN), it generates a 0; otherwise a 1. Guess, what?! If you tell the computer to average that column of 1s and 0s, that turns out to be the average that worked! You may turn in this spreadsheet in lieu of items 2 and 3 above (but don’t forget items 1, 4, 5, and 6!!!). You may also email all of this if you so desire: [j.harvey@tcu.edu](mailto:j.harvey@tcu.edu).