

There are two papers in this file:

1. Maybe the Boys Just Like Economics More - The Gender Gap and the Role of Personality Type in Economics Education
2. Is Cash Dead? Using Economic Concepts to Motivate Learning and Economic Thinking.

MAYBE THE BOYS JUST LIKE ECONOMICS MORE - THE GENDER GAP AND THE ROLE OF PERSONALITY TYPE IN ECONOMICS EDUCATION

by

Stephen Hickson*

Abstract

Do females achieve lower grades in economics than males? What role does personality type play in any difference if one exists? This study examines a cohort of first year students who all took Principles of Economics courses and completed the Myers-Briggs Type Indicator questionnaire at a large publically funded New Zealand university. I find that males do enjoy a comparative advantage in economics (or females a comparative *disadvantage*). This does not disappear when personality type is controlled for but does persist. Some personality types also achieve higher grades in their study than others. Most studies in the literature have tended to focus on economics but I am able to conduct the same analysis on the other first year courses that these students take. This enables a point of comparison allowing me to examine if gender and personality type effects are unique to economics or whether economics is actually no different to other disciplines.

JEL Categories: A22

Keywords: Principles of Economics, Gender, Personality Type, Myers-Briggs Type Indicator.

June 2015

*Stephen Hickson is a Teaching Fellow in the Department of Economics and Finance at the University of Canterbury. His contact details are: Department of Economics and Finance, University of Canterbury, Private Bag 4800, Christchurch 8042, New Zealand; Email: Stephen.hickson@canterbury.ac.nz. Phone: +64 3 364 2847.

The author wishes to thank his colleague, Dr Andrea Menclova (one of only two women in the Department of Economics and Finance at the University of Canterbury) for her very helpful comments and insights. All opinions and errors are the author's responsibility.

I. INTRODUCTION

The finding that males outperform females in the study of economics is reasonably well established in the literature. Many studies attempt to control for other factors but a gender bias remains. For example, Robson & Walstad (1997) find a persistent difference after controlling for test instrument type. Anderson et al (1994) and Elzinga & Melaugh (2009) find a persistent gender bias even after controlling for a range of educational, demographic and social factors.

A small number of studies have utilised the Myers Briggs Type Indicator (a personality typing tool described in the following section for those unfamiliar with it) to examine how personality type impacts on achievement in economics and how this might also affect the findings on gender difference.

The Myers-Briggs Type Indicator

The Myers-Briggs Type Indicator (MBTI) was developed by Katharine Briggs (1875 – 1968) and her daughter Isabel Briggs Myers (1897 – 1980). They formalised into a usable tool the ideas of Swiss psychiatrist Carl G. Jung (1875 – 1961). The standard method for determining personality type is via a 93 question forced-choice questionnaire. Jung theorised that differences in the way that people behave are not random but conform to patterns. Such patterns arise from natural (or innate) preferences that manifest themselves as psychological types. We all use all of the processes described but we do not use them all with equal comfort. For example, students who prefer to work alone will work in groups and be successful but for them it is harder than for those who have a natural preference to work with others.

At the heart of the theory is the idea that people engage in two types of process – taking in information and then making decisions. These two processes produce the first two of the four dichotomies in the MBTI. The first is known as the “Sensing(S)-Intuition(N)” dichotomy and describes how people prefer to receive information and the sort of information they are most likely to seek and trust. Those who prefer a sensing process prefer to take in information that is real and tangible (“what their senses can tell them”). They are practical and realistic, preferring to start at the start and take things one step at a time and build carefully in a detailed way. “S types” are often specific and literal and are good with facts. People who prefer intuition like to take in information by

seeing the big picture. They see patterns and relationships between facts and are good with ideas. They look for possibilities and are conceptual and abstract. They may leap from one point to another including straight to the conclusion and often speak in general or metaphorical terms.

Some words that we might associate with each are:

S:	Facts	Realistic	Specific	Present	Keep	Practical	What is
N:	Ideas	Imaginative	General	Future	Change	Theoretical	What could be

The second dichotomy is the “Thinking(T)-Feeling(F)” dimension. People who prefer thinking prefer to make their decisions using impersonal objective logic. They assess the pros and cons and are good at analysing a situation. They are likely to focus on problems and tasks. People who prefer feeling prefer to use their personal values in decision making. They assess how any particular decision is likely to affect people or groups of people. They are likely to focus on the impact on relationships.

Some words that we might associate with each:

T:	Head	Distant	Things	Objective	Critique	Analyse	Firm but fair
F:	Heart	Personal	People	Subjective	Praise	Understand	Merciful

Jung also described an orientation or where we focus our energy. The “Extroversion(E)-Introversion(I)” dichotomy describes this. People who prefer extroversion focus their energy outwards and orient themselves to the world of people and things. They enjoy contact with others – in fact they are energised by other people. They think as they speak so their discussions take place “in front of their face”. People who prefer introversion focus their energy inwards and orient themselves to their inner world of thoughts and feelings. They prefer to interact with people who they know and are often made weary by too much contact with others. Introverts think then speak and the conversation for them goes on “inside their head”.

Some words that we might associate with each:

E:	Action	Outward	People	Interaction	Many	Expressive	Do-Think-Do
I:	Reflective	Inward	Privacy	Concentration	Few	Quiet	Think-Do-Think

The last dichotomy relates to how people deal with or prefer to interact with the outer world –the “Judging(J)-Perceiving(P)” dichotomy. People who prefer to use their judging process seek to organise the world. They prefer to live in a planned, organised way and will usually have a plan or schedule. They like to make decisions and then move on. People who prefer to use the perceiving process seek to experience the world. They prefer to live in a spontaneous and flexible way and plans and schedules are seen as constraints. They will often delay making decisions (“just in case”)

but adapt well to changing circumstances. “J types” look at the world and see decisions that need to be made, “P types” look at the world and see options to be explored.

Some words that we might associate with each:

J:	Organised	Decision	Control	Now	Closure	Deliberate	Plan
P:	Flexible	Information	Experience	Later	Options	Spontaneous	Wait

These four dichotomies provide 16 unique combinations (e.g. ISTJ). Each has a different learning style (see Lawrence 2010). For example, ISTJs are analytical managers of facts and details. They are systematic, dependable and thorough. They are good at organising facts and will follow a sensible path grounded in their experience. They stick with the tried and true and are unlikely to change unless there is very good reason to do so. ISTJs will do well in a structured environment where expectations are clear and consistent and application to the task can bring success.

Other Studies

Borg & Shapiro (1996) find that “I types” outperform “E types” in Principles of Macroeconomics courses at the University of North Florida.. While the coefficients for S, T and J are positive, they are not statistically significant. They find that there is a negative effect of having a personality type of ENTP, ESTP or ENFP. They also find that gender is not a significant determinant of grade once personality type is controlled for. Borg & Shapiro make use of a four-way combination of type (SJ, SP, NT, NF) called temperament (see Appendix 1 for a description of these four temperament combinations) and they find that “SJ types” perform better than the other three with NT and NF being significant. They also find some evidence that matching the temperament of the student with the teacher has a positive outcome. However, their sample size is only 119 students and 3 teaching staff.

Ziegert (2000) replicates the study of Borg & Shapiro (1996) although with a larger sample size of 617 students. Ziegert also estimates positive coefficients for I, S, T and J but in this case finds that S and T are statistically significant. Along with Borg & Shapiro (1996), Ziegert also finds that SJ types outperform the other three temperaments and that gender is not statistically significant once personality type variables are included. In contrast to Borg & Shapiro (1996), Ziegert finds no support for the idea that personality type of faculty matters in terms of matching with that of the student.

Borg & Stranahan (2002a) build on Borg & Shapiro (1996) and Ziegert (2000) to examine personality type and other variables in upper level classes in economics. They also find that “I types” have an advantage as do “SJ” types relative to the other three temperaments. They introduce interaction terms between gender and personality type and find that a difference does persist for gender. Some combinations matter more than others and it is not a simple picture of “males outperform females”. Like Ziegert (2000), they find no support for the student/teacher personality type matching hypothesis. Borg & Stanahan (2002b) is an expansion of the race and gender question that is touched on in the first article (the two articles share much common material). They find that being NF or NT for females is likely to lead to poorer performance but this disadvantage is not present for male NF or NT type students. They conclude that “...gender is an important determinant of student performance...” (p. 596).

Swope & Schmitt (2006) find evidence that “J types” perform better than “P types” with other personality dimensions not significant. They also find that gender is not significant. However, their study is for economics majors over their entire course of study and females have self-selected into this group. Despite a relatively large sample (over 1,000 students), there are only few females included in the study as the sample was 92 percent male being drawn from a US Naval Academy.

II DATA

This study was conducted at a large public New Zealand university. Two principles of economics courses are taught – Microeconomics and Macroeconomics. Both are offered twice a year in each of the two semesters. All students in the cohort year were asked to complete the MBTI questionnaire in return for a small amount of bonus credit in their course work. There are a total of 856 students in the cohort and 553 out of 853 (response rate=64.8 percent) completed the MBTI questionnaire (249 females (response rate= 68.2 percent) and 304 males (response rate=62.3 percent)). Students without an MBTI result are discarded from all the analysis. Many of these 553 students have more than one observation in the principles courses dataset as they will have taken both microeconomics and macroeconomics meaning there are a total of 809 grades for principles of economics courses as a whole (364 female and 445 male). Separate grades for the same student are treated as separate observations for the Economics courses. As well as grades in their principles of economics courses, I am also able to access grades in other courses. There are 2,860 “other first year grades” (1,243 female and 1,617 male). All results are aggregated to groups and individual students cannot be identified.

Grades were converted to a GPA score¹ to aid in the analysis. Table 1 shows simple t-tests for differences in GPA for different comparison groups.

TABLE 1: Descriptive Statistics: Academic Performance

Group	N	Mean	Std. Dev.	t-statistic for difference
Economics First Year	809	3.7	3.0	-2.239***
Other First Year	2,860	4.0	2.9	
Economics First Year – female	364	3.8	3.1	0.211
Economics First Year – male	445	3.7	2.9	
Other First Year – female	1,243	4.3	3.0	4.989***
Other First Year – male	1,617	3.8	2.8	
All First Year – female	1,607	4.2	3.0	4.421***
All First Year – male	2,062	3.8	2.8	
Economics First Year – male	445	3.7	2.9	-0.299
Other First Year – male	1,617	3.8	2.8	
Economics First Year – female	364	3.8	3.1	-3.017***
Other First Year – female	1,243	4.3	3.0	
Economics First Year – microeconomics	445	3.9	3.1	1.268
Economics First Year – macroeconomics	1,617	3.6	2.8	
Domestic First Year – economics	707	3.8	3.0	2.410**
International First Year – economics	102	3.1	3.2	
Domestic First Year – other	2,539	4.1	2.9	4.178***
International First Year – other	321	3.4	2.9	

*** and ** indicate statistical significance at the 99% and 95% confidence levels, respectively.

The mean grade in economics is lower than in other first year courses although by gender the difference is only significant for females. Females do better in first year courses than males although when this is split into Economics and Other, only the difference for Other is significant. While the mean for Microeconomics is higher than that for Macroeconomics, the difference is not statistically significant.

The straight comparison of means also suggests that domestic students achieve higher grades in both economics and other courses at first year.

How does the subset of students who are included in the sample as they have an MBTI type compare to those who are excluded? Table 1(A) below shows selected descriptive statistics for the excluded students.

¹ Grades are awarded in the range of A+, A, A-, B+...C-, R, D, E. An “R” grade is a restricted pass where students are able to count the course for credit but cannot use it as a pre-requisite for other courses. GPA conversions are A+=9, A=9, ...C-=1, R=1, D=0, E=-1.

TABLE 1(A): Descriptive Statistics: Academic Performance

Group	N	Mean	Std. Dev.	t-statistic for difference
Economics First Year	404	1.7	2.7	-4.309***
Other First Year	1581	2.4	2.7	
Economics First Year – female	153	1.7	2.6	-0.146
Economics First Year – male	251	1.7	2.7	
Other First Year – female	617	2.5	2.8	1.56
Other First Year – male	964	2.3	2.7	

*** and ** indicate statistical significance at the 99% and 95% confidence levels, respectively.

As could be expected the mean values are lower. Students who are not engaged in the course and hence end up failing are less likely to complete the MBTI questionnaire for course credit. Within this group it is still the case that the economics grade is lower than for other first year courses. The MBTI sample shows a gender difference in mean GPA for other first year courses which is not present in the excluded set of students.

Table 2 shows the MBTI breakdowns by gender for this study and the comparison to the National Representative Sample (NRS) (Briggs Myers et al, 2009). Only one aspect of each preference scale is reported as the other is easily deduced.

TABLE 2: Descriptive Statistics: Personality Types

	This Study		NRS	
	N=304	N=249	N=1,478	N=1,531
Preference	Male	Female	Male	Female
E	49.3	54.6	45.9	52.5
S	46.1	51.4	71.7	74.9
T	63.8	36.6	56.5	24.5
J	43.4	58.6	52.0	56.2
<i>Borg & Shapiro (1996) Temperaments</i>				
SJ	25.0	35.7	43.1	49.5
SP	21.1	15.7	28.6	25.3
NT	31.3	16.1	14.8	5.9
NF	22.7	32.5	13.5	19.2

The cohort used in this study is similar to the NRS in that the proportion of male “T types” is larger than female “T types” (correspondingly, female “F types” exceed male “F types”) and there are a greater proportion of NT males than NT females. However, there are fewer “S types” of both genders in my sample with S preferences being more prevalent in the general population. This is perhaps not surprising given the conceptual / abstract nature of much of university study.

I am also able to use University administrative data which allows me to control for whether a student is domestic or international and whether his/her first language is English or not.

III STUDY METHODS

I define the following variables:

ECONGPA	GPA score for the Economics Principles courses
OTHRGPA_MEAN	Mean grade point average for “Other” (non-economics) first year courses
ECONGPA_MEAN	Mean grade point average for economics first year courses
MALE	1 if male, 0 if female
ENGLISH	1 if the student selected English as his/her first language.
DOMESTIC	1 if a domestic student, 0 if international.
MICRO	Applies to economics courses only – 1 if micro, 0 if macro.
MBTI_TYPES	A range of dummy variables for all the MBTI combinations of interest.

The model is specified as follows:

$$\begin{aligned} (1) \quad \text{ECONGPA} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \alpha_4 \text{MICRO} \\ (1A) \quad \text{OTHRGPA_MEAN} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} \\ \\ (2) \quad \text{ECONGPA} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \alpha_4 \text{MICRO} + \\ &\quad \alpha_5 \text{MBTI_TYPES} + \alpha_6 (\text{MBTI_TYPES} * \text{MALE}) \\ (2A) \quad \text{OTHRGPA_MEAN} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \\ &\quad \alpha_5 \text{MBTI_TYPES} + \alpha_6 (\text{MBTI_TYPES} * \text{MALE}) \end{aligned}$$

The first specification (1 and 1A) makes the simple comparison between the economics GPA (with a control variable for whether it is micro or macro) and the GPA from all other first year courses.

The second specification (2 and 2A) adds in various combinations of MBTI type variables and their interactions with gender. The first set of personality types are the 4 basic dichotomies; the second utilises all 16 MBTI types; the third uses the Borg & Shapiro (1996) temperament combinations; and the fourth the (NF, NT, SF, ST) set.

An expanded specification of the above four is also included where I add in the other dependent variable as a control for academic ability as follows:

$$\begin{aligned} (3) \quad \text{ECONGPA} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \alpha_4 \text{MICRO} + \\ &\quad \alpha_7 \text{OTHRGPA_MEAN} \\ (3A) \quad \text{OTHRGPA_MEAN} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \alpha_7 \text{ECONGPA_MEAN} \\ \\ (4) \quad \text{ECONGPA} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \alpha_4 \text{MICRO} + \\ &\quad \alpha_5 \text{MBTI_TYPES} + \alpha_6 (\text{MBTI_TYPES} * \text{MALE}) + \alpha_7 \text{OTHRGPA_MEAN} \\ (4A) \quad \text{OTHRGPA_MEAN} &= \alpha_0 + \alpha_1 \text{MALE} + \alpha_2 \text{ENGLISH} + \alpha_3 \text{DOMESTIC} + \\ &\quad \alpha_5 \text{MBTI_TYPES} + \alpha_6 (\text{MBTI_TYPES} * \text{MALE}) + \alpha_7 \text{ECONGPA_MEAN} \end{aligned}$$

IV RESULTS

For easier visualisation, only results that are statistically significant at the 90% confidence level in at least one of the columns in the table are reported.

TABLE 3: Baseline Determinants of Academic Performance (Model Specifications 1 and 3)

Variable	(1) Dependent Variable: ECONGPA	(1A) Dependent Variable: OTHRGPA_MEAN	(3) Dependent Variable: ECONGPA	(3A) Dependent Variable: OTHRGPA_MEAN
MALE	-0.008 (-0.03)	-0.542** (-2.46)	0.581*** (4.03)	-0.538*** (-3.92)
DOMESTIC	0.779** (2.11)	0.602* (1.75)	-0.021 (-0.09)	0.195 (0.91)
MICRO	0.275 (1.23)	N.A	0.752*** (5.22)	N.A
OTHRGPA_MEAN	N.A	N.A	1.003*** (35.43)	N.A
ECONGPA_MEAN	N.A	N.A	N.A	0.626*** (27.34)
R^2	0.0117	0.0195	0.5965	0.6089
N	742	493	742	493

Numbers in parentheses are heteroskedasticity-adjusted t-statistics. ***, **, and * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.

Table 3 provides evidence of the comparative advantage that males appear to enjoy in economics relative to other first year courses. In (1) and (1A) the comparative advantage remains and when a measure for academic ability is included (3 and 3A) the advantage emerges even more clearly with the MALE coefficient being positive in the economics specification (3) and negative in the Other Courses (3A). Other studies find an absolute advantage for male students in economics which is what is now being picked up in (3) and (3A).

In our sample, males do worse in tertiary study than females but NOT in economics. Another way to view this is that the general advantage enjoyed by females in tertiary study is not present in economics. Hence, females have a comparative *disadvantage* in economics.

There is also a premium for domestic students in both economics and in general study although not when a broader measure for academic ability is included. However, what this suggests is that international students do worse in both economics and other courses to a similar extent – the advantage to domestic students persists.

TABLE 4: Four Basic MBTI Types and Academic Performance (Model Specifications 2 and 4)

Variable	(2) Dependent Variable: ECONGPA	(2A) Dependent Variable: OTHRGPA_MEAN	(4) Dependent Variable: ECONGPA	(4A) Dependent Variable: OTHRGPA_MEAN
MALE	0.316 (0.74)	-0.367 (-0.94)	0.530* (1.75)	-0.406 (-1.44)
DOMESTIC	0.920** (2.47)	0.747** (2.19)	-0.007 (-0.03)	0.253 (1.16)
I	0.828** (2.37)	0.777** (2.25)	0.179 (0.82)	0.203 (0.95)
J	1.370*** (3.89)	1.351*** (4.02)	0.123 (0.55)	0.428** (2.08)
MALE * T	0.632 (1.32)	0.139 (0.30)	0.529* (1.69)	-0.329 (-1.11)
MALE * J	-0.770* (1.66)	-0.522 (-1.27)	-0.183 (-0.62)	-0.135 (-0.500)
MICRO	0.323 (1.48)	N.A	0.757*** (5.26)	N.A
OTHRGPA_MEAN	N.A	N.A	0.997*** (32.57)	N.A
ECONGPA_MEAN	N.A	N.A	N.A	0.608*** (26.64)
R^2	0.0593	0.1007	0.5989	0.6201
N	742	493	742	493

Numbers in parentheses are heteroskedasticity-adjusted t-statistics. ***, **, and * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively. The omitted MBTI category is the other of the pair (e.g. “E” is omitted for the EI dichotomy). Only results that are statistically significant at the 90% confidence level in at least one of the columns in the table are reported.

In this specification, the male comparative advantage moderates but does not entirely disappear. In (2) and (2A), the coefficients for MALE are positive and negative, respectively, but neither is statistically significant. In (4) and (4A), the coefficients are again positive and negative, respectively, with the ECONGPA coefficient statistically significant. The difference between the two coefficients is possibly significant (indicating the male comparative advantage) and this could be tested.

In (2) and (2A), there is evidence for a general premium for “I and J types”. Borg & Shapiro (1996) find the same result for “I types” though not for J. Ziegert (2000) finds S and T significant but not J. However, the result above for “J types” is not surprising. Recall that “J types” favour a structured, organised environment. They usually plan well and are motivated by the achievement of completing tasks. “P types” prefer a flexible, spontaneous environment that can be explored rather than managed. Deadlines and schedule are confining. They are energised by responding in resourceful

ways to a changing environment. It should be reasonably evident that most first year environments are more welcoming to “J type” students compared to “P type” students.

Similarly, the result for “I types” has a reasonably intuitive explanation. “I types” are drawn to their inner world of thoughts and reflections. They learn by reflection and prefer depth to breadth. “E types” turn their attention to their outer world. They prefer to process with others and are often active learners. Most first year study is individual and based around lectures with relatively low student engagement; it involves mastering ideas and concepts in some depth in order to do well.

Interestingly, the coefficients for the interaction term MALE*J in all four columns are negative (though only one is statistically significant). This implies that the J premium works differently for males than it does for females – i.e. it is smaller for males. This is consistent with the notion that there is something systematic about lower student achievement at tertiary level for males than females but this even carries into economics where males have a comparative advantage.

Do the results of (4) and (4A) indicate that MBTI types have little explanatory power? Not necessarily. The measure being used for overall academic ability is a blunt tool and not particularly independent. The results above indicate that MBTI types are related to ECONGPA in the same way that they are related to OTHRGPA. Hence, when ECONGPA is used as an independent variable in OTHRGPA, the MBTI type groups become at least partly explained by ECONGPA and so less significant. Hence, (2) and (2A) are the most useful specifications in teasing out the overall (or reduced-form) impact of MBTI groups.

TABLE 5: Sixteen MBTI Types and Academic Performance (Model Specifications 2 and 4)

Variable	(2) Dependent Variable: ECONGPA	(2A) Dependent Variable: OTHRGPA_MEAN	(4) Dependent Variable: ECONGPA	(4A) Dependent Variable: OTHRGPA_MEAN
MALE	-0.004 (0.02)	-0.568** (-2.52)	0.595*** (3.87)	-0.575*** (-3.86)
DOMESTIC	0.853** (2.36)	0.727** (2.16)	-0.026 (-0.11)	0.239 (1.10)
ISFJ	0.678 (1.32)	0.177 (0.31)	0.563* (1.69)	-0.299 (-0.81)
ISTP	-1.004* (-1.67)	-0.811 (-1.47)	-0.310 (-0.86)	-0.087 (-0.27)
ISFP	-0.628 (-0.99)	-1.035 (-1.64)	0.347 (1.07)	-0.715** (-2.19)
INFP	-1.838*** (-3.12)	-1.697*** (-2.77)	-0.129 (-0.30)	-0.778* (-1.94)
ESFJ	-1.126** (-2.09)	-1.034** (-2.09)	-0.205 (-0.63)	-0.495 (-1.59)
ESTP	-0.569 (-0.87)	-1.066** (-2.23)	0.253 (0.58)	-0.609** (-2.12)
ESFP	-2.457*** (-4.86)	-2.374*** (-4.6)	-0.192 (-0.49)	-0.825* (-1.96)
ENTP	-2.054*** (-4.22)	-2.018*** (-4.34)	-0.113 (-0.33)	-0.852*** (-2.63)
ENFP	-1.318*** (-3.04)	-1.535*** (-3.83)	-0.045 (-0.15)	-0.605** (-2.04)
MICRO	0.347 (1.61)	N.A	0.759*** (5.29)	N.A
OTHRGPA_MEAN	N.A	N.A	0.987*** (31.85)	N.A
ECONGPA_MEAN	N.A	N.A	N.A	0.607*** (25.40)
R^2	0.0879	0.1200	0.6024	0.6222
N	742	493	742	493

Numbers in parentheses are heteroskedasticity-adjusted t-statistics. ***, **, and * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively. The omitted MBTI category is ISTJ. Only results that are statistically significant at the 90% confidence level in at least one of the columns in the table are reported.

In (2) and (2A), we see that a number of MBTI groups do worse in both economics and other courses compared to the omitted ISTJ group. Of the six groups that are significant in economics GPA, five are “P types”. This is not surprising and is consistent with the 4 basic dichotomies set above (Table 4).

The male comparative advantage (or female comparative disadvantage) in economics does not disappear under this specification. Recall that in our sample 60 percent of females are “J types” and

only 40 percent of males are “J types”. However, if the gender difference was purely one of personality type then the gender effect would disappear; it does not.

In (4) and (4A), the MBTI types become less significant. All MBTI types that remain significant in (4A) are “P types” providing further evidence that “J types” are advantaged.

Consistent with our previous findings, the female comparative disadvantage does not disappear when the 16 MBTI groups are used as control variables.

TABLE 6: Borg & Shapiro Temperaments and Academic Performance (Model Specifications 2 and 4)

Variable	(2) Dependent Variable: ECONGPA	(2A) Dependent Variable: OTHRGPA_MEAN	(4) Dependent Variable: ECONGPA	(4A) Dependent Variable: OTHRGPA_MEAN
MALE	-0.218 (-0.56)	-0.423 (-1.08)	0.503** (2.05)	-0.478* (-1.89)
DOMESTIC	0.671* (1.85)	0.539 (1.60)	-0.049 (-0.21)	0.192 (0.89)
NT	-1.604*** (-2.95)	-1.067* (-1.93)	-0.420 (-1.04)	-0.152 (-0.40)
SP	-1.304*** (-2.59)	-1.216** (-2.39)	-0.133 (-0.47)	-0.351 (-1.19)
MICRO	0.277 (1.26)	N.A	0.750*** (5.20)	N.A
OTHRGPA_MEAN	N.A	N.A	0.996*** (33.76)	N.A
ECONGPA_MEAN	N.A	N.A	N.A	0.621*** (26.94)
R^2	0.0388	0.0553	0.5990	0.6123
N	742	493	742	493

Numbers in parentheses are heteroskedasticity-adjusted t-statistics. ***, **, and * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively. The omitted MBTI category is SJ. Only results that are statistically significant at the 90% confidence level in at least one of the columns in the table are reported.

Like this study, Borg & Shapiro (1996) and Ziegert (2000) also find a negative effect for “NT types” relative to the omitted SJ category. Neither finds a statistically significant result for SP although their coefficients are also negative. That “SJ types” do relatively better is to be expected. The typical first year experience fits an “SJ type” very well. Material is presented in a sequential way, there is often little expectation of independent discovery of knowledge and tasks are usually well defined.

Using this set of MBTI combinations, specifications (2) and (2A) suggest that the male comparative advantage largely disappears and that MBTI types explain the gap. The MALE coefficient in the OTHRGPA_MEAN set is still negative and larger than that in ECONGPA but neither is significant.

On the other hand, (4) and (4A) provide some evidence that the difference is persistent and has not disappeared. The signs of the coefficients for the MBTI combinations are still negative but are not significant. However, as previously noted, the effect of OTHRGPA_MEAN and ECONGPA_MEAN as explanatory variables is possibly concealing the MBTI effect.

TABLE 7: Four Basic MBTI Pairs and Academic Performance (Model Specifications 2 and 4)

Variable	(2) Dependent Variable: ECONGPA	(2A) Dependent Variable: OTHRGPA_MEAN	(4) Dependent Variable: ECONGPA	(4A) Dependent Variable: OTHRGPA_MEAN
MALE	-0.486 (-0.99)	-1.052** (-2.26)	0.649** (2.29)	-0.794*** (-2.71)
DOMESTIC	0.692* (1.91)	0.514 (1.51)	-0.049 (-0.21)	0.183 (0.84)
NF	-0.509 (-0.99)	-0.660 (-1.36)	0.230 (0.79)	-0.529* (-1.74)
NT	-1.63*** (-2.63)	-1.329** (-2.15)	-0.237 (-0.56)	-0.405 (-0.96)
SF	-0.718 (-1.39)	-1.082** (-2.15)	0.213 (0.73)	-0.607* (-1.95)
MICRO	0.288 (1.30)	N.A	0.753*** (5.22)	N.A
OTHRGPA_MEAN	N.A	N.A	1.000*** (35.23)	N.A
ECONGPA_MEAN	N.A	N.A	N.A	0.623*** (27.03)
R^2	0.0293	0.0442	0.5992	0.6141
N	742	493	742	493

Numbers in parentheses are heteroskedasticity-adjusted t-statistics. ***, **, and * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively. The omitted MBTI category is ST. Only results that are statistically significant at the 90% confidence level in at least one of the columns in the table are reported.

This combination provides evidence that the male comparative advantage in economics is persistent. The MALE coefficient in (2A) is a larger negative than that in (2) and the coefficient in (2A) is significantly different from zero whereas that in (2) is not. In (4) and (4A), the difference emerges clearly with a statistically significant positive MALE coefficient for ECONGPA and a negative coefficient for OTHRGPA.

The MBTI coefficients are all negative indicating a disadvantage compared to “ST types”. This possibly reflects the nature of first year study where courses tend to be constrained rather than free-thinking. Assignments are usually tightly structured, material is often presented in a well

organised and sequential way. Attention is given to detail. Much of the material presented is easily tested in invigilated examinations. This conclusion may change as students progress to higher levels of study and the emphasis shifts to higher levels of learning (synthesis and analysis). That is not to say that there is no higher learning at first year just that there is less of it; thereby giving an advantage to those who do well in that environment. One might easily imagine that “NT types” have an advantage at higher levels. This will make for an interesting study that our dataset will enable as our cohort of students progresses.

V CONCLUSION

This study starts by highlighting a number of statistical results from the sample used:

- Grades in Principles of Economics classes are lower than in Other first year classes.
- Females achieve higher grades in their non-economics first year courses than males but there is no statistically significant difference in economics suggesting a comparative disadvantage for females in economics.
- This is supported by the finding that females achieve higher grades in their non-economics courses than their economics courses but for males there is no difference.

Do these findings change when controlling for personality type via the Myers-Briggs Type Indicator (MBTI)? Does personality type have any impact on achievement? The literature is not settled on these topics. The novel contribution of this study is being able to compare the effect of the MBTI on grades in other first year courses to the effect in economics.

I find that some personality types are positively related to university achievement. “J types” enjoy an advantage in all the specifications either with an explicit positive coefficient for a “J type” combination or with a negative coefficient for a “P type” (e.g. ESFP). There is also evidence that “I types” have an advantage in first year study. An interesting question is whether this finding will change as these students progress through to higher, more abstract levels of study.

The comparative disadvantage for females does not disappear. In some specifications the size of the impact is moderated by controlling for personality types but a difference persists.

A cursory examination of Economics Departments at universities will reveal a gender imbalance with relatively few female staff. What is it about the discipline of economics that provides females with a comparative disadvantage? One potential answer lies in the fact that “T types” are more prevalent in males than females. “T types” prefer to make decisions using impersonal objective logic. They assess the pros and cons and are good at analysing a situation. “F types” use their personal values in

decision making. They assess how any particular decision is likely to affect people or groups of people. If the teaching of economics is presented in a way which appeals to “T types”, then this will naturally favour males. The more general advantage enjoyed by females at tertiary level study will be offset by the “T” advantage that males have. In table 4 the coefficient for (MALE*T) in specification (4) is positive and significant. Not only is there a higher prevalence of “T types” within males, they receive an enhanced premium from being a “T type” compared to females.

The objective here is not necessarily to achieve some arbitrary gender ratio. Rather it is to examine if there are systemic or systematic factors that perpetuate a lower level of engagement from females in the discipline of economics. If those factors are mitigated then the discipline could obtain a new depth and richness and be even more relevant to a diverse world. If some of those factors are related to how the subject is taught then this finding should challenge the way that we teach economics and the topics that we choose to cover.

REFERENCES

- Anderson, G., Benjamin, D., & Fuss, M. A. (1994). The determinants of success in university introductory economics courses. *The Journal of Economic Education*, *25*(2), 99-119. doi:10.1080/00220485.1994.10844820
- Borg, M. O., & Shapiro, S. L. (1996). Personality type and student performance in principles of economics. *The Journal of Economic Education*, *27*(1), 3-25. doi:10.1080/00220485.1996.10844890
- Borg, M. O., & Stranahan, H. A. (2002a). Personality type and student performance in upper-level economics courses: The importance of race and gender. *The Journal of Economic Education*, *33*(1), 3-14. doi:10.1080/00220480209596120
- Borg, M., & Stranahan, H. (2002b). The effect of gender and race on student performance in principles of economics: The importance of personality type. *Applied Economics*, *34*(5), 589-598. doi:10.1080/00036840110039239
- Briggs Myers, I., McCaulley, M., Quenk, N., & Hammer, A. (2009). *MBTI Manual (3rd edition)*. CPP. Inc. USA.
- Elzinga, K. G., & Melaugh, D. O. (2009). 35,000 principles of economics students: Some lessons learned. *Southern Economic Journal*, *76*(1), 32-46. doi:10.4284/sej.2009.76.1.32
- Lawrence, G. (2010). *Looking at Type and Learning Styles*. Centre for Applications of Psychological Type. USA.
- Robson, D., & Walstad, W. (1997). Differential item functioning and male-female differences on multiple-choice tests in economics. *The Journal of Economic Education*, *28*(2), 155-171. doi:10.1080/00220489709595917
- Swope, K. J., & Schmitt, P. M. (2006). The performance of economics graduates over the entire curriculum: The determinants of success. *The Journal of Economic Education*, *37*(4), 387-394. doi:10.3200/JECE.37.4.387-394
- Ziegert, A. L. (2000). The role of personality temperament and student learning in principles of economics: Further evidence. *The Journal of Economic Education*, *31*(4), 307-322. doi:10.1080/00220480009596449

APPENDIX 1 – BORG AND SHAPIOR TEMPERAMENTS

Reproduced from Borg & Shapiro (1996).

Dionysian (SP)

SP students prefer physical involvement in the learning process and want to be able to try things themselves through a hands-on experience. They also learn best when they are entertained, so they enjoy multimedia presentations such as videos and computer simulations. SPs tend to be competitive and often respond well to group projects, particularly if the groups are involved in some sort of contest, such as a stock market game. SPs require a great deal of variety in the learning environment, and if this is lacking, they may become disruptive. A standard lecture format with Socratic questioning is deadly boring to an SP student, as is most traditional paperwork such as workbooks and end-of-the-chapter questions. The subjects that SP students prefer are music, drama, art, crafts, and mechanics.

Epimethean (SJ)

The learning style of an SJ student is almost made-to-order for a traditional lecture-based classroom. SJs like and need structure in the learning environment so they prefer a sequential presentation of the material in increments that make sense to them. SJs do best when they have well-defined tasks assigned to them and clear directions. They do not like long-term independent projects and may prefer to have a paper topic assigned to them rather than have to choose their own. SJs may become uncomfortable in classroom discussions unless they are carefully controlled by the teacher. SJs prefer to study facts and procedures and are often at a loss when an assignment requires them to improvise or be creative. SJs gravitate toward university business and professional classes and often choose practical professions such as accounting and teaching.

Promethean (NT)

NTs tend to be independent learners and are often self-sufficient in the classroom. Unlike SJs, NT students want to choose their own research paper topics and would even like to have some control over the subject matter of the course. NTs are most comfortable with a logical, didactic presentation of the material and need few, if any, examples to follow up a theoretical presentation. In fact, they may become impatient if the professor seems to belabor a point with too much explanation. Often NTs become intrigued by some aspect of the course and investigate that area on their own. This can be to the detriment of their grade in the course if it causes them to neglect other aspects of the course. NTs are often loners in class, especially if they are also introverted. They are often intellectual snobs and may suffer fools badly. Because they prefer to have discussions with the professor rather than with other students, they do not interact well in group discussions or group assignments.

Apollonian (NF)

NF students enjoy a democratically run classroom with plenty of interaction with other students and the professor. NFs enjoy group projects as long as the group works cooperatively rather than competitively. Very competitive environments are counter-productive for NF students because they tend to be hypersensitive to hostility and conflict. NFs learn best through class discussion and case studies because they like instruction to relate to people. Because of the ease with which NF students express themselves, they do better in classes that require papers and essays rather than more objective means of evaluation. In addition, because NFs value personal recognition, a handwritten note of approval on a paper or test is often a stronger motivator than a good grade.

Source: D. Keirse and M. Bates. 1984. *Please understand me: Character and temperament types*. 5th ed. Del Mar, Calif.: Prometheus Nemesis.

IS CASH DEAD? USING ECONOMIC CONCEPTS TO MOTIVATE LEARNING AND ECONOMIC THINKING.

by

Philip Gunby and Stephen Hickson*

Abstract

Economics is at its best when used to shed light on questions of interest to students. Even better if the answers are at odds with commonly held but incorrect views. The velocity of circulation is probably the most neglected concept in macroeconomics classes but it can be used to open up a discussion on the behaviour of people and why demand for money may rise or fall. It can be used to address the question “Is Cash Dead?” Despite the rise in the number of ways that people can pay without using cash, there seems to be no drop in the amount of cash people actually wish to hold. This is a puzzle and a good opportunity to get students thinking about why this might be.

JEL Categories: A22

Keywords: Principles of Economics, Velocity of Circulation, Cashless Society.

November 2016

*Philip Gunby is a Senior Lecturer and Stephen Hickson is a Teaching Fellow in the Department of Economics and Finance at the University of Canterbury. Contact details are: Department of Economics and Finance, University of Canterbury, Private Bag 4800, Christchurch 8042, New Zealand; Email: Stephen.hickson@canterbury.ac.nz. Phone: +64 3 364 2847.

1. INTRODUCTION

The velocity of circulation (V) makes its grand entrance as the left hand side of a definition ($V=PY/M$), is then re-arranged to sit alongside another variable ($MV=PY$), and is quickly consigned to the bin labelled “stays constant”. From that point on V makes no further appearances on stage and is rapidly forgotten.

This is a shame because V can in fact be used to stimulate learning and economic thinking in a number of ways.

1. It is easy to calculate so a course lecturer can set a student assignment that focuses on the key skills of sourcing, selecting and presenting data.
2. Students can then provide an interpretation of what a rising or falling V means in terms of people demanding money.
3. Students can analyse why V may be rising or falling. The emphasis is on proposing plausible theories that use economics to explain what is observed.

In particular, a focus on the velocity of circulation of cash allows students to address the question of whether or not we are actually moving to a cashless society (as many people probably believe).

In this paper we focus mostly on the velocity of circulation of cash as that is most relevant to considering the “cashless society” question. However, the velocity of circulation for other monetary aggregates is easy to calculate and also useful.

The velocity of circulation has not always been so neglected. This paper examines how principles texts have treated the velocity of circulation and how it has changed over time. We suggest some potentially useful narratives that might enrich the teaching of macroeconomics and conclude with some suggestions for the classroom.

2. WHAT IS V?

The velocity of circulation is most easily thought of as the speed at which money circulates around the economy.¹ For a given nominal value of expenditure, how many times does a unit of currency change hands? If economic agents wish to hold a large amount of money relative to their expenditures then velocity will be slow and the converse is true for smaller desired holdings. This idea is captured in the definitional equation of

$$\text{velocity of circulation (V)} = \text{Nominal GDP (P.Y)} / \text{Money supply (M)}$$

The variable P is the “price level”², Y is real GDP and M is one or other of the measures of monetary aggregates³.

From there this identity is usually re-arranged to the familiar “equation of exchange” or $M.V = P.Y$. For most texts, the purpose of the equation of exchange is to explain the relationship between M and P . Hence at this point, it is usually assumed that V is constant and that Y is determined by things other than M or P . As Blaug (1995) explains:

“...the quantity theory of money really consists of three interrelated propositions: (a) the causal arrow runs from money M to prices P ...; (b) there is a stable demand for nominal money-balances-to-hold, sometimes known as the velocity of circulation of money V ...; and (c) the volume of transactions T or the volume of output Y ... is determined independently of the quantity of money or the level of prices but rather by real variables such as endowments, preferences and technology.” (page 29)

From these propositions and the equation of exchange the crude quantity theory of money can be derived where:

$$P = (MV)/Y \quad \rightarrow \quad M = k P \quad \text{where } k = (Y/V)$$

¹ For the really interested there are usually two concepts of the velocity of circulation. One is called the transactions velocity where the number of transactions (T) is the quantity variable, i.e. $V = (PT)/M$. The income velocity usually takes the quantity variable as real GDP hence the right hand side has nominal GDP, i.e. $V = (PY)/M$. In practice the number of transactions (T) is not observable so it is the income velocity that is being referred to. These measures can be quite different. For example, an economy with a large number of transactions for second hand goods will have a different transactions velocity than another economy with a smaller number of such transactions. However, both may have the same income velocity of circulation. This paper will use the term “velocity of circulation” and is referring to the income velocity measure.

² The exact definition of price level is usually left vague. The common implication is that the consumers’ price index (CPI) the relevant measure. However, if the income (or GDP) measure of the equation of exchange is used then P is more accurately the GDP deflator. For practical purposes at principles level, this distinction makes little difference.

³ While any of the usual monetary definitions can be used, the focus of this paper will primarily be on notes and coins due to the interest in the idea of a cashless society.

In other words the price level will always be some constant multiple of the money supply determined by the ratio of Y to V .

All of this serves to get to the end point which is to show that changes in the price level are brought about by (exogenous) changes to M .

To make this more explicit, sometimes the equation of exchange will be converted into a dynamic (approximation) form where

$$\% \Delta M + \% \Delta V = \% \Delta P + \% \Delta Y^4$$

With this form it is now possible to interpret each of the variables in growth form so that

$\% \Delta M$	=	growth in the money supply
$\% \Delta V$	=	change in the velocity of circulation.
$\% \Delta P$	=	inflation
$\% \Delta Y$	=	economic growth

If $\% \Delta V$ is assumed to be constant (usually equal to zero) and $\% \Delta Y$ is assumed to grow at a constant rate (e.g. 3 percent) then there exists a clear relationship between money growth and inflation.⁵

Another way to think about V is that it is "...the inverse of the percentage of income that people keep in the form of money. ... Velocity is therefore essentially a measure of income-adjusted money demanded" (Caplan, 2009). This turns out to be a very useful pedagogical way to think about V as if V is rising then money demand is falling in real terms and vice versa.

The quantity theory of money is one of the "oldest surviving theories in economics" (p27, Blaug et al, 1995). Blaug (1995) credits John Locke with the earliest coherent statement of the quantity theory in 1692. However, the early economists did not simply assume the velocity of circulation away or see it as little analytical use.

Laidler (1991, p16) notes how early monetary economists (for example Mill and Hume) were well aware that assuming a constant velocity of circulation was convenient but did not hold in the real world. Laidler (1991, p127) lays out the work of Knut Wicksell who saw the availability of credit as a major influence on changes in V and hence on changes to the price level. He also notes the work of Fisher in setting out some determinants of the velocity of circulation (p72) including both speculative and precautionary types of motives. Bordonio and Jonung (1987, p19) note that Irving Fisher stresses the transaction motive for money and so expected V to continue to rise as financial innovation reduced

⁴ a more mathematically accurate method is to take logs and then totally differentiate. However, this method is well beyond Principles courses so the percentage change approximation is often used.

⁵ This is equivalent to taking the Classical Dichotomy (the distinction between real and nominal variables and that money affects nominal but not real variables) as a reasonable starting position to take.

the need for money balances to settle transactions. Blaug (1995) notes that the three interrelated propositions that underlay the quantity theory of money (see above) “...are highly controversial and by no means truisms” (page 29).

3. HOW IS V TREATED IN TEXTBOOKS?

Has it always been the case that economics educators would consign V to the “held constant” bin early in the lesson? As table 1 shows, the answer is no. The most striking example is that of the 1951 edition of Samuelson where the velocity of circulation is given quite some space. However, more recent textbooks spend much less time discussing V – in some cases almost no time.

TABLE 1: Survey of Principles Texts

Text	Pages on the QTM / EOE ⁶	Comments
Samuelson “Economics” (1951), 2 nd Edition	9	Although the QTM appears in an appendix it is dealt with in some depth. The text starts with the simple form $M = kP$. After discussing the inadequacy of this, V is then introduced. The author asserts that “...the velocity of circulation is not even approximately constant.” The author puts the failure of quantity theorists (who took V as constant) down to focusing on the transactions demand for money and ignoring other reasons why people hold money (“the velocity varies with changes in interest rates, expectations, saving and investment schedules, and other economic variables.” – i.e. certainty, stability of the financial system, etc.).
Samuelson et al “Economics” (1975), 2 nd Australian edition based on the 9 th US Edition	8	This edition is somewhat softer on the notion that V is nowhere near constant but there is still a clear assertion that an assumption of constancy is not reasonable (“while V is definitely not a constant, its movements are subject to some regularity and predictability”). The velocity of circulation gets a further mention in the appendix to a later chapter (18)
Begg, Fischer and Dornbusch “Economics” (1984). 1 st edition.	1	The QTM discussion is a side box. The text argues that V will be constant except as interest rates and inflation vary (“...if inflation and nominal interest rates settle down at some particular level, velocity will become constant”).

⁶ QTM: Quantity Theory of Money. EOE: Equation of Exchange.

Abel and Bernanke "Macroeconomics", (2005), 5 th edition.	4	The text starts with the definition of V and re-arranges to $MV = PY$. Notes that V for $M1$ is "...clearly not constant" and notes potential reasons (interest rates and financial innovation). Velocity of $M2$ is "...closer to being constant". There is no discussion of how and why V might or could change. A graph of $M1$ and $M2$ velocity is shown.
Stiglitz and Walsh "Economics" (2006), 4 th edition.	2	The velocity of circulation is defined and explained and then assumed as essentially constant (" <i>For a given level of velocity...</i> ").
Mankiw "Principles of Macroeconomics" (2015), 7 th edition.	3	The text starts with the definition of V and re-arranges to $MV = PY$. V is considered stable (" <i>The velocity of money is relatively stable over time.</i> "). There is no discussion of how and why V might or could change.
McTaggart, Findlay and Parkin "Economics", (2013), 7 th edition.	2	The text starts with the definition of V and re-arranges to $MV = PY$. The text implicitly assumes the stability of V . There is no discussion of how and why V might or could change.

4. THE VELOCITY OF CIRCULATION

Modern texts pay less attention to the velocity of circulation than older ones and are more likely to assume (explicitly or implicitly) that V is constant. Who is right?

Data

Figures 1 and 2 show the velocity of circulation for notes and coins (N&C) and for $M1$ for New Zealand. The N&C graph is from 1961 and $M1$ is from 1936.

Figure 1: Velocity of circulation for Notes and Coins (1961 – 2014)

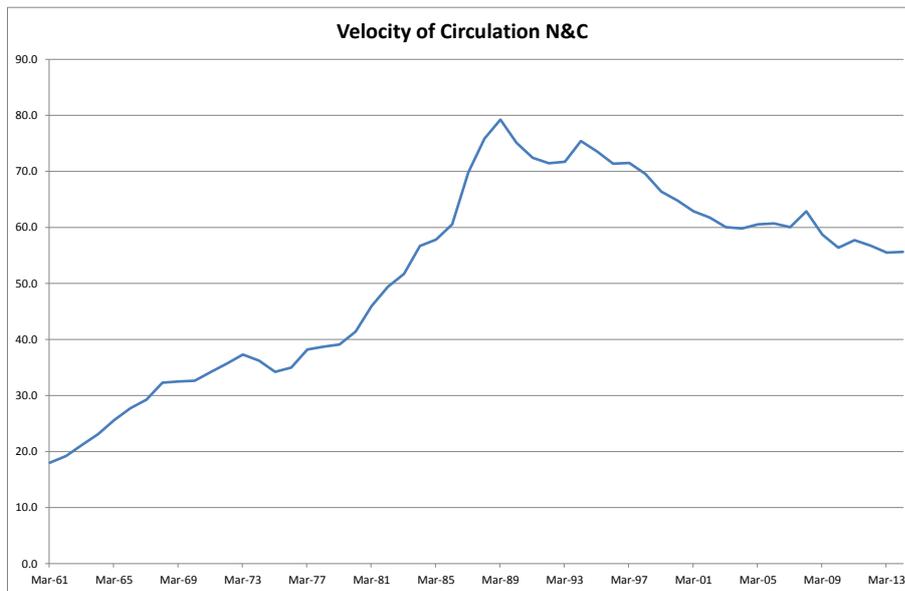
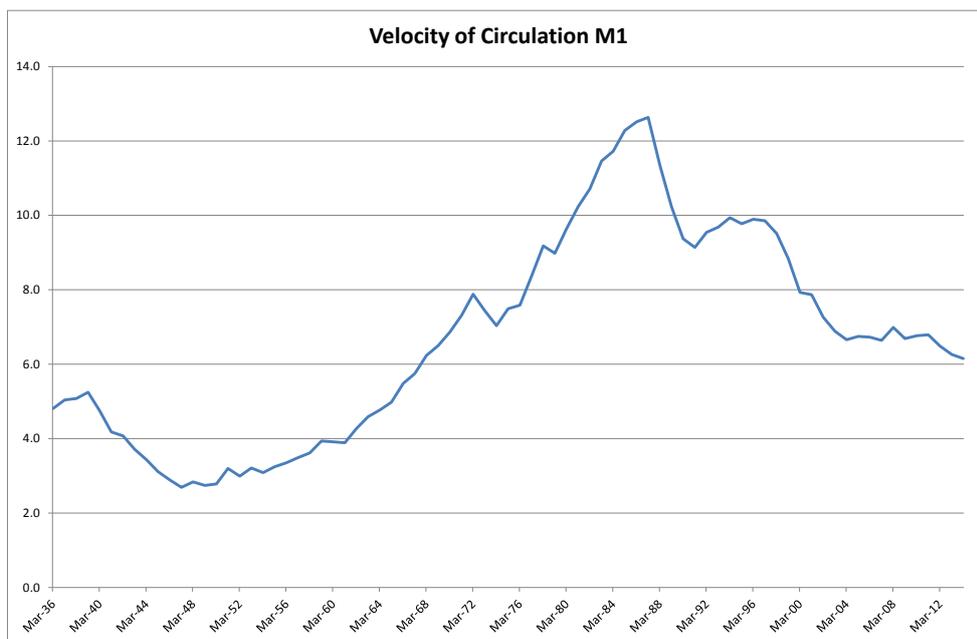


Figure 2: Velocity of circulation for $M1$ (1936 – 2014)

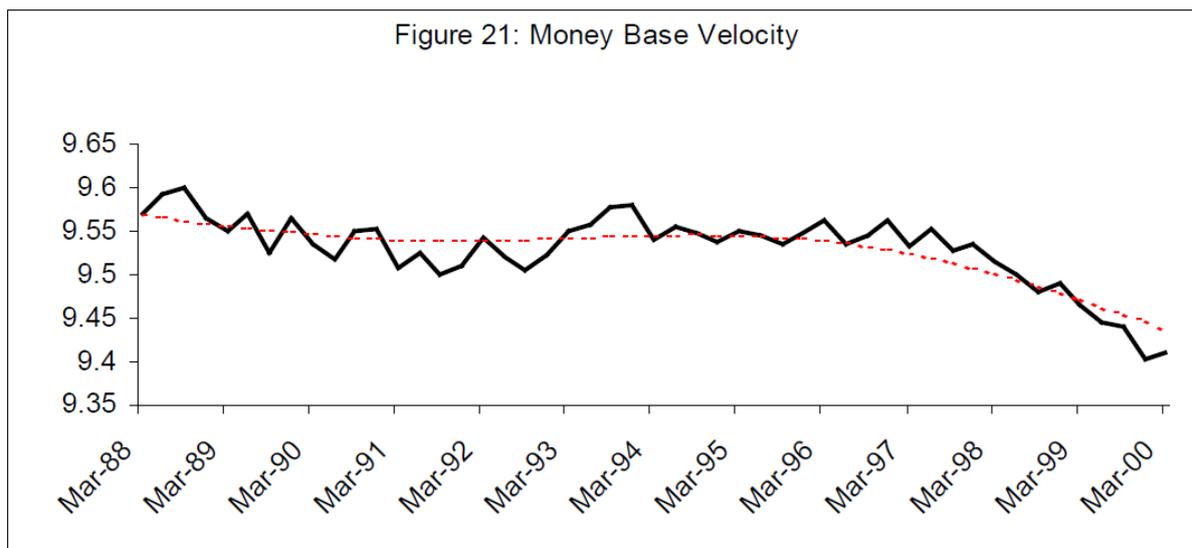


M1 velocity is noticeably U shaped from the 1930's until around 1987. After 1987 there is a clear downward trend. Notes and coins follows the same pattern for the same time period although the post mid-1980s decline is less steep than it is for M1.

The U shape until the late 1980s is unsurprising. In what is a widely cited work, Bordo and Jonung (1987) examine the long run velocity of circulation for M2 from the late 1800s until around 1980 for a range of countries. They find a consistent “U shaped” curve for most countries with a turning point around the middle of the 20th century. Within that broad picture they find significant fluctuations, particularly around major events. For example, V declines significantly (so demand for money rises) in all countries at the time of the Great Depression.

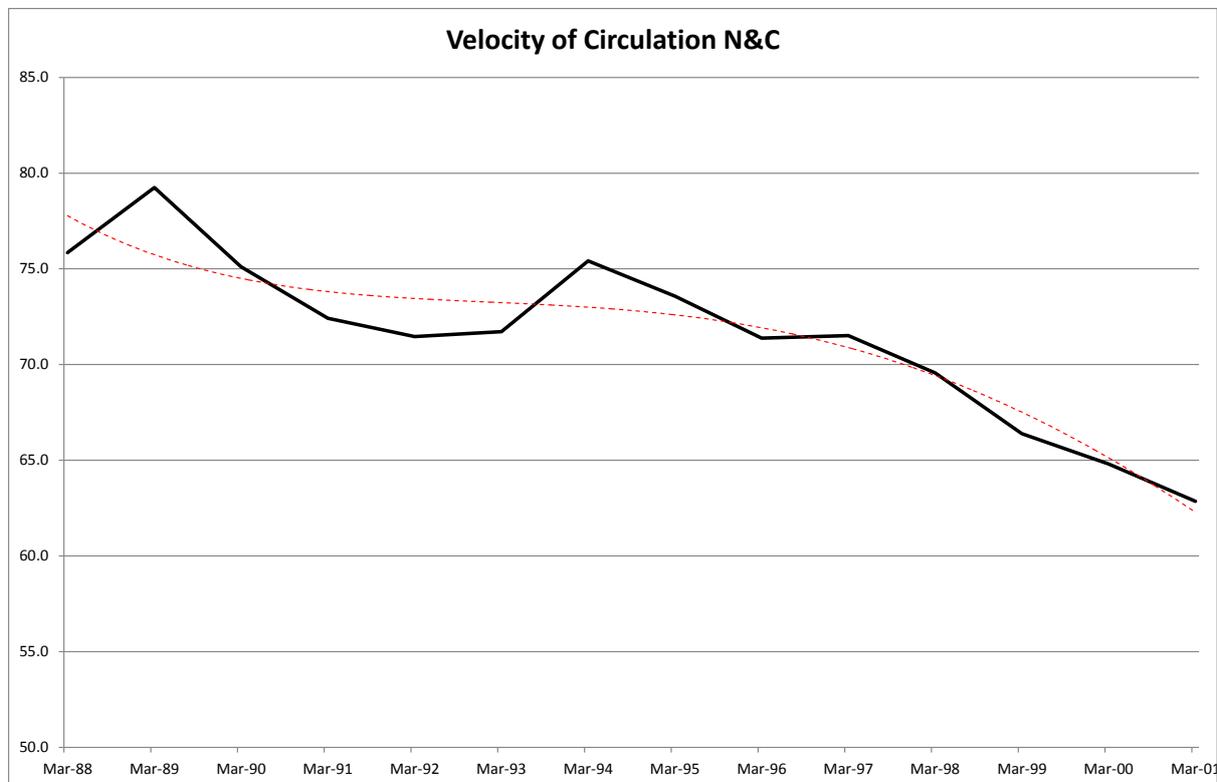
The decline in V is also consistent with other studies (e.g. Siklos and Eckhold 1997). Razzak (2001) examines the velocity of circulation for the monetary base (essentially notes and coins) from 1988 to 2001. Razzak uses quarterly data and a CPI measure for the price level which differs from our study. He finds little evidence of a trend from 1988 to 1997 but then a declining trend after that. However, the Razzak study is for a relatively short time period and the conclusion is based on a trend line⁷. When Razzak’s graph is compared to our data for the same period, a distinctly similar pattern is revealed (see figures 3 and 4).

Figure 3: Razzak (2001)



⁷ Razzak uses the term “trend” in the sense of decomposing a time series into its three constituent parts: trend (or permanent), seasonal (or business cycle) and irregular.

Figure 4: Our data for the same time period



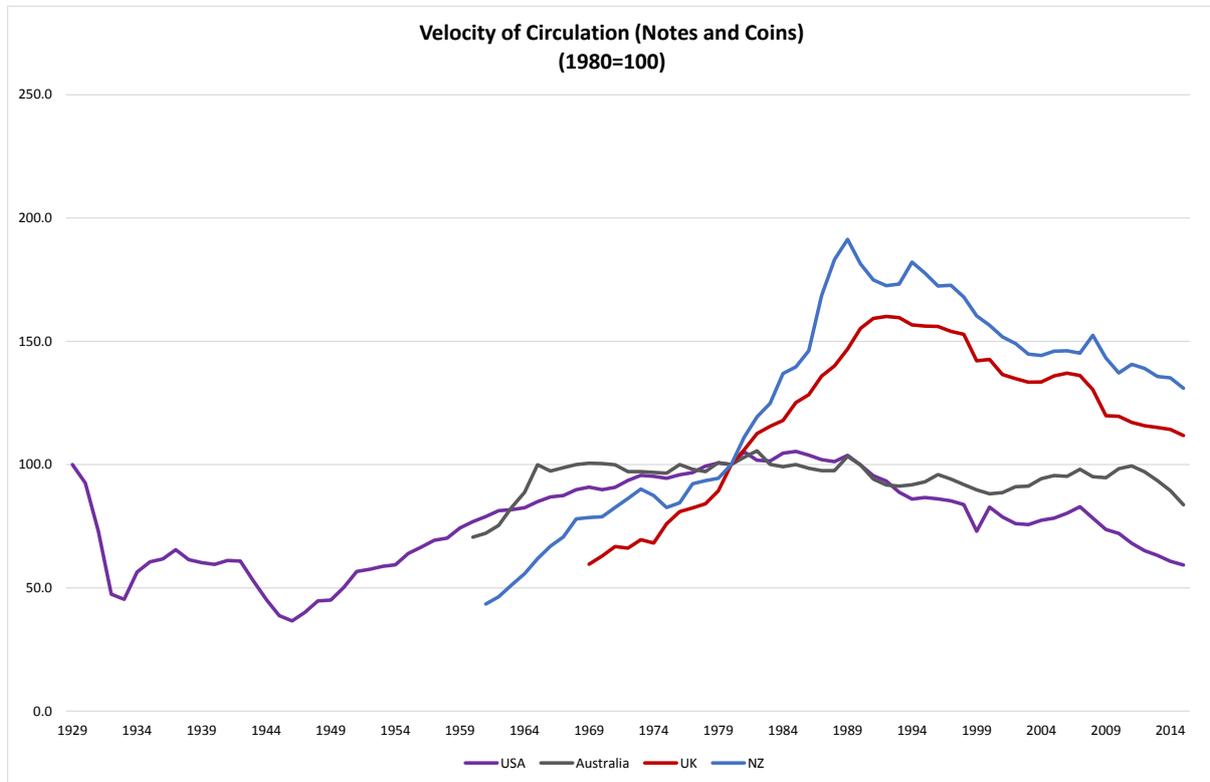
(Trend line is a simple 4th order polynomial best-fit function).

The long run picture then, is for a U shaped velocity of circulation until a turning point in the 1980s. Since then V has largely declined although not uniformly.

In the short run however, V is more stable (as Razzak (2001) notes). From 1988 to 2014 (the period of decline) the average percentage change from one year to the next is -2.2 percent. In those 26 years, only seven have percentage changes outside the range (-5.0, +5.0) – six are negative and one positive. Clearly V is not a random walk.

Figure 5 below shows V for notes and coins for four selected countries. All four exhibit a similar pattern although of differing magnitudes with Australia the least pronounced.

Figure 5: Notes and Coins Velocity of Circulation for NZ, Australia, UK and US (Index 1980=100)



In broad terms the overall picture is one of declining velocity of circulation from the start of the 20th century to around the middle of the century. There then follows an increasing velocity until around the late 1980s / early 1990s. After that the velocity of circulation declines.

A falling V means that from the start of the 20th century to the middle of it, demand for cash holdings was falling. For around the next 40 years cash demand falls as shown by V rising. After that demand for cash increases again. Explaining these rises and falls is the next task.

5. WHAT CAUSES V TO CHANGE?

Bordo and Jonung (1987) discuss a number of possible explanations for the U shaped curve that exists until around the 1980s.

- income (an idea advanced by Friedman and Schwartz in 1963) – money is a luxury good and demand for holding cash balances rises as income rises. However, this explanation suggests a falling velocity and fails to explain the subsequent rise.
- interest rates – while well understood as a determinant of money demand, the role of interest rates fail to explain the long run behaviour.
- expected inflation – higher rates of expected inflation will increase the velocity of circulation. However, this is unlikely to explain long term, secular changes in V .
- financial innovation – the rising availability of credit instruments and money substitutes reduces the need for cash holdings and hence increases V .
- money as a medium of exchange – if the transactions motive for holding money is the biggest influence on money demand then the need to hold money will decline and V will rise as advancing technology in the finance sector makes alternative payment methods more common.
- randomness – however this is unlikely to explain a long run trend.

Bordo and Jonung (1987) do not find any of these explanations wholly satisfactory. Instead they explain the fall in V by

“... the monetization process. This process consists of two interrelated developments: (1) the growing use of “money” for settling transactions at the expense of a decline in barter and payments in kind, occurring simultaneously with an expansion of markets and a decline of production for own consumption; and (2) the rise of a commercial banking system supplying the public with notes and deposit facilities.”

The subsequent rise in V is

“...explained by increasing financial sophistication and improved economic security and stability. Financial sophistication as defined here refers to both (1) the emergence of a large number of close substitutes for money, such as bonds, common stocks, and other financial assets, that reduce the demand for money as an asset; and (2) the development of various methods of economizing on money balances, such as the use of credit cards, the transfer of funds by telegraph, by telephone, or electronically, and modern cash management techniques that reduce the transactions demand for money.”

The argument here is that money substitutes such as credit cards and the ability to transact electronically reduce the need for balances to be held in an easily spent form. Ireland (1991) finds evidence that supports Bordo and Jonung's institutional view.

These arguments foreshadow what should be a continuing rise in V as demand for cash continues to fall as society moves to an even more financially sophisticated system. Siklos and Eckhold (1997) expected this. Many in society would likely agree given their day to day experience with online payments, use of credit cards and new mobile phone based technologies. This view is reinforced by headlines such as "*The countries where cash is on the verge of extinction*"⁸ and "*Sweden Is Developing the World's First Cashless Economy*"⁹. Many people have a growing sense that cash is costly to handle and riskier to hold as suggested in a news article headed "*The real cost of carrying cash*"¹⁰. Reading that "*Woman donates \$26,000 to Salvation Army - by mistake*"¹¹ simply confirms what we all thought all along – cash is risky.

But V does not continue to rise. This implies a greater demand for cash as Boaden (2008) noted when he said "The demand for currency by the New Zealand public continues to grow steadily each year despite the popularity of electronic methods of payment." Partly there will be a confusion between what money people wish to use for transaction purposes and what money they wish to hold in total with the former being seen and the latter unseen.

What has caused the somewhat unexpected decline in V ? This is the very interesting question for students to propose theories for. There are no clear and obvious explanations as to why people are holding more cash and not less. Razzak (2001) speculates that stable and low inflation as well as lower interest rates may be having an effect meaning that cash holders are willing to hold greater quantities of cash¹². Razzak also suggests that the underground economy (with its greater use of cash) and ATM fees (meaning households prefer to make fewer withdrawals of larger amounts) might also increase the demand for cash. However, none of these explanations would explain the continuing *long run* decline.

⁸ <http://www.bbc.com/capital/story/20160922-the-countries-where-cash-is-on-the-verge-of-extinction>

⁹ <https://www.good.is/articles/sweden-becoming-first-cashless-modern-society>

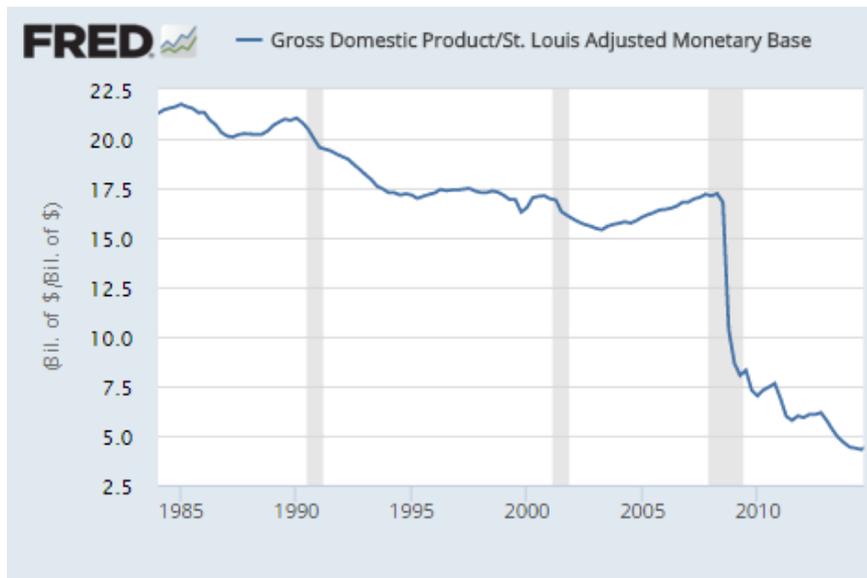
¹⁰ <http://www.stuff.co.nz/business/money/78960155/the-real-cost-of-carrying-cash>

¹¹ <http://www.stuff.co.nz/world/australia/81833663/woman-donates-35000-to-salvation-army--by-mistake>.

The woman in question donated her cushions to the second hand store forgetting she had stored cash in them.

¹² See this article for a supporting resource: <http://www.economist.com/news/britain/21707061-low-interest-rates-mean-amount-cash-circulation-rising-plastic-banknotes-come>

The Federal Reserve Bank of St. Louis (2014) in one of its short reports on the economy note how, rather than being constant in recent years, V has slowed dramatically following a period of decline since the mid-1980s as has occurred in New Zealand (see graph below).

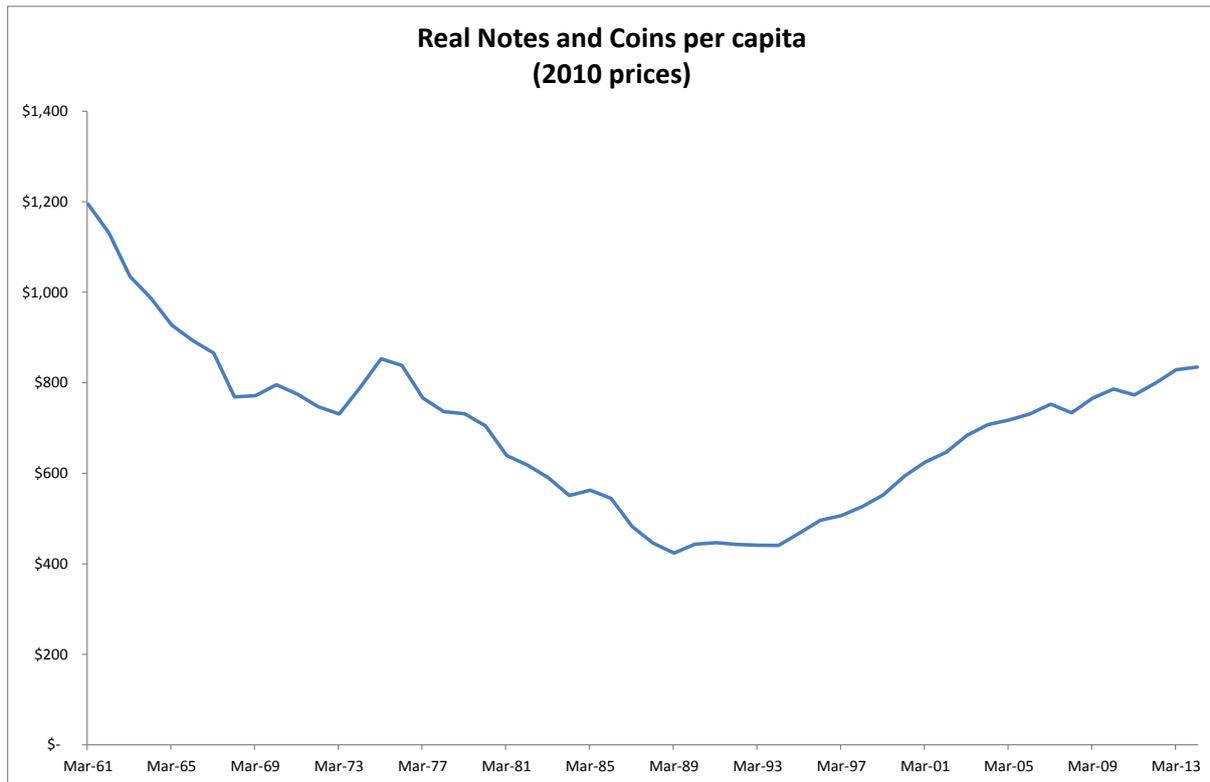


(Source: Federal Reserve Bank of St Louis, 2014).

The Federal Reserve Bank of St Louis (2014) credit the cause of the recent decline to the “...private sector’s dramatic increase in their willingness to hoard money instead of spend it.” Why this increase? They suggest two reasons: (i) a “gloomy economy”; and (ii) a sharp reduction in interest rates which prompts a move towards holding more cash in investment portfolios. The exact meaning of a “gloomy economy” is difficult to determine. One possible interpretation is that a poor economy means fewer transactions so velocity falls but this is a dramatic fall. We suggest the increased perceived risk premium of the financial sector following the global financial crisis has led to an increased desire to hold cash as a relatively risk-free asset. This is exacerbated by the fall in interest rates but would likely have occurred regardless as faith in the financial sector was eroded. After all, interest rates have been low before. Again none of this explains the *long term* decline.

Figure 6 shows the real value of notes and coins per capita for New Zealand. As can be seen, the quantity of cash falls until around the late 1980s before rising again.

Figure 6: Real Notes and Coins per Capita



For whatever reason, money holders are holding more cash relative to the value of their transactions and more cash in real terms. . It would seem that the shift to a cashless society is yet to occur in New Zealand, Australia, the UK and US at least.

Some countries do seem to be shifting in that direction. Sweden (which is mentioned in the news articles above) does seem to be one of these as the following table of notes and coins values shows.

Banknotes and coins	2011	2012	2013	2014	2015
Average value of banknotes & coins in circulation (SEK bn)	99	94	88	80	77

Source: <http://www.riksbank.se/en/Notes--coins/Statistics/>

However, the interesting question is to explain those who are not.

6. BRINGING THIS INTO THE CLASSROOM

Appendix 2 contains a suggestion for a student assignment. The assignment aims to build three useful skills:

1. collect, select and present data;
2. explain and interpret results; and
3. propose plausible theories that are grounded in economics for those results.

A graph of the velocity of circulation is easy to create. If not used in a take home assignment, a graph of V could be created in class time and be used for participation type credit. All it requires are monetary aggregates (available from most central bank websites) and nominal GDP¹³. From there, the following narrative is helpful.

1. *For the first part of the 20th century, V slows down.*

V declines as households shift towards money and away from other payment methods (e.g. barter) and from consuming their own household production. The economy is specialising, trading and “monetising”.

2. *It then speeds up until around the mid to late 1980s.*

The subsequent rise reflects the development of the financial system and alternative ways to pay. Demand for cash therefore declines so V rises. The high inflation rates of the 1970s and 1980s may also have contributed to the continuing rise of V for notes and coins through this time. Higher inflation rates results in greater costs of holding cash so we would expect V to rise. However, V was rising before this period so inflation cannot be a full explanation.

3. *V then declines and has continued to do so.*

The fall in V from the 1980s is more surprising and difficult to explain but also very interesting. By the mid-1980s there was an expectation that financial innovation would continue to drive V ever upwards – especially for notes and coins – as financial innovation reduced the demand for cash. But for whatever reason, demand for cash has been rising. Exactly why this is can be a great question for discussion even in a large lecture setting. Students can discuss with their neighbour before sharing “plausible theories” as to why people are holding more cash. Some suggestions include:

¹³ See appendix 3 for a list of data sources.

- falling confidence in the finance system (which could be due to recurring financial markets events such as the 1980s savings and loans crisis, the 1987 stock market crash, the 2008 GFC, and European Sovereign Debt crises).
- an expanding black market and grey economy where transactions are conducted in cash.
- a greater number of smaller value transactions require greater holdings of cash.
- a rise in the precautionary motive as continued low interest rates that have existed since the early 1990s make the cost of holding cash small.
- leakages due to tourists not converting currency, losses “down the back of the couch”, etc.

4. *Are we moving towards a cashless society?*

Cash, it would appear, is not dead despite widely held views that a “cashless society” is upon us. The Reserve Bank of New Zealand (Boaden 2008, Flavell 2011) notes the continued growth in cash rather than its decline and figure 6 above (which is on a real per capita basis) confirms this. Popular media articles will pick up on this, often with some surprise in their tone.¹⁴ While it is true for New Zealand that the proportion of money that people hold as notes and coins relative to $M3$ declined from around 8.8 percent in 1961 to 1.6 percent in 2015 all of this decline occurred prior to 1990 and the proportion has varied little since then (and averaged 1.7 percent). The value of notes and coins in circulation grew by an average of 6.4 percent from 1990 to 2014 while nominal GDP grew by 4.9 percent. While more and more transactions are conducted in non-cash ways, cash holdings are still very attractive. Perhaps people just like it.

5. *V is not constant long term but is close enough to being so short term*

For purposes of instruction it is useful to assume that V is roughly constant. Is this reasonable? The velocity of circulation is clearly not a random walk and V typically does not vary dramatically from one period to the next. The velocity of circulation for $M1$ in New Zealand was 9.4 in 1990 and had fallen to 6.1 in 2014. On a straight line basis that’s an average decline of 1.4 percent per year.¹⁵ For principles of macroeconomics courses this can be taken as close enough to being constant *in the short run*. For a more sophisticated treatment, the instructor could use the dynamic form:

¹⁴ See for example <http://www.smh.com.au/money/why-cash-isnt-going-the-way-of-the-cheque-20160224-gn2m8g.html> in Australia and <http://www.stuff.co.nz/business/money/9134911/Cash-refuses-to-die> in New Zealand.

¹⁵ A strict average of the absolute values of the percentage changes has an average of 3.4 percent per year.

$$\% \Delta M + \% \Delta V = \% \Delta P + \% \Delta Y$$

Rather than assuming $\% \Delta V = 0$, it could be assumed that $\% \Delta V = -2\%$. That does not negate the basic point but does provide a more nuanced and correct treatment.

6. *Monetary policy is more complicated when V isn't constant*

A closer examination of the velocity of circulation provides a platform for further discussion on how variation in V could make monetary policy more complicated than an assumption of constant V would suggest. For example, attempts by central banks to stimulate economies following the Global Financial Crisis may have been partially neutralised by a slowing velocity of circulation. RBNZ Governor Dr Alan Bollard noted in a 2012 speech delivered to the Australian National University in Canberra that the "...early evidence suggests that it (*quantitative easing*) does work to some degree to stimulate the economy, although the precise mechanisms involved are still a matter of some debate" (RBNZ, 2012). In a world where the velocity of circulation is not constant, monetary policy becomes substantially more difficult. This is not necessarily a new realisation. In 1983 Gerald Bouey, as Governor of the Bank of Canada, stated that "We did not abandon $M1$, $M1$ abandoned us." (Bouey, 1983). The belief that central banks could simply target $M1$ growth in order to control inflation had proven to be incorrect and the world is indeed a far messier place.¹⁶

This contrasts with the way in which monetary policy is sometimes taught – that a central bank simply pulls the lever and gets the expected outcome that it wants. This may be more relevant to instructors of intermediate macroeconomics.

¹⁶ The Bank of Canada has an excellent piece at <http://www.bankofcanada.ca/2000/10/can-a-bank-change/>. Sections 2.4 to 2.6 are particularly relevant and include the quote from Bouey. Canada was the 2nd country, after New Zealand, to introduce an explicit, publically known inflation target.

V CONCLUSION

The assumption that the velocity of circulation is constant is a useful one in Principles of Macroeconomics courses. It allows instructors to draw the link between money and prices which is a key concept underlying monetary policy. However, V is not constant, particularly over the longer term, and there are some interesting questions that can be examined by having a look at what actually has happened to V . The decline in V for the first half of the 20th century and the subsequent rise until around the 1980s are easy to explain and are built on interesting stories about money and methods of payment. The decline from the 1980s is more puzzling and a good opportunity for students to put forward plausible theories for what is happening.

Asking how many students believe that we are moving to a cashless society is likely to reveal that a majority do believe this to be true. But is cash dead? The evidence provided by graphs of real notes and coins per person and the velocity of circulation of notes and coins suggests otherwise. Such graphs are easy to create and relatively straightforward for students to grasp. The topic lends itself to an assignment that builds useful skills or to more active and interactive forms of teaching as it is simple to do in real time.

In the short term, assuming V is constant is tolerably close to reality. However, incorporating a non-zero value in the dynamic (percentage change) form of the quantity theory of money is not difficult. By moving away from the simple assumption of “ V is constant”, we are forced to confront the question that the central bank must face – what assumption *should* be made about V ? This alerts students to the more complicated nature of monetary policy in a changing and uncertain world. This latter point is probably more relevant to instructors of intermediate macroeconomics but could easily be covered in principles courses.

Economics is at its best when it addresses questions that students had never thought to ask because surely the answer is obvious but when it turns out the answer is not.

REFERENCES

- Blaug, M., et al. (1995). *The quantity theory of money. From Locke to Keynes and Friedman*. Edward Elgar. USA.
- Bloor, C., Hunt, C., Ng, T., and Pepper, H. (2008). The use of money and credit measures in contemporary monetary policy. *Reserve Bank of New Zealand Bulletin*, 71(1), 5-15.
- Boaden, A. (2008). Recent trends and developments in currency. *Reserve Bank of New Zealand Bulletin*, 71(1), 16-24.
- Bordo, M. D., & Jonung, L. (1987). *The long-run behaviour of the velocity of circulation*. Cambridge University Press. USA.
- Bouey, G. (1983). Canadian House of Commons Standing Committee on Finance, Trade and Economic Affairs. Minutes of Proceedings and Evidence, No. 134, 28 March 1983, p. 12.
- Caplan, B. (2009). *What is money velocity?* Retrieved April 2, 2016, from http://econlog.econlib.org/archives/2009/11/what_is_money_v.html
- Federal Reserve Bank of St. Louis. (2014). *What Does Money Velocity Tell Us about Low Inflation in the U.S.?* Retrieved April 22, 2016, from <https://www.stlouisfed.org/on-the-economy/2014/september/what-does-money-velocity-tell-us-about-low-inflation-in-the-us>
- Flavell, K. (2001). Recent trends and developments in currency – 2010/2011. *Reserve Bank of New Zealand Bulletin*, 74(3). 22-29.
- Ireland, P., N. (1991). Financial Evolution and the Long-Run Behavior of Velocity: New Evidence from U.S. Regional Data. *Economic Review*, Nov/Dec 1991, 16-26.
- Laidler, D. E. W. (1991). *The golden age of the quantity theory: The development of neoclassical monetary economics, 1870-1914*. New York: P. Allan.
- Razzak, W., A. (2001). Money in the Era of Inflation Targeting. *Reserve Bank of New Zealand Discussion Paper Series*, DP2001/02.
- Reserve Bank of New Zealand. (2012). *Learnings from the Global Financial Crisis*. Retrieved June 29, 2016, from <http://www.rbnz.govt.nz/research-and-publications/speeches/2012/speech2012-08-09>
- Siklos, P., L., & Eckhold, K., R. (1997). Income Velocity in Turbulent Times: The Role of Institutional Factors in the New Zealand Experience. *Journal of Macroeconomics*, 19(1), 31–52

APPENDIX 1: MONETARY AGGREGATES DEFINITIONS

Notes and coin held by the public

Notes and coin on issue minus currency held by *M3* institutions.

M1

Includes notes and coin held by the public plus chequeable deposits, minus inter-institutional chequeable deposits, and minus central government deposits, all in New Zealand dollars.

M2

Consists of *M1* plus all non-*M1* call funding (call funding includes overnight money and funding on terms that can of right be broken without break penalties) less inter-institutional non-*M1* call funding. (See "Transaction EFTPOS (excl. cheque)").

M3

The broadest monetary aggregate. Represents all New Zealand dollar funding of *M3* institutions. Consists of notes & coin held by the public plus NZ dollar funding minus inter-*M3* institutional claims and minus government deposits.

Source: <http://www.rbnz.govt.nz/statistics/c1>

Transaction EFTPOS (excluding cheque)

Deposits accessible by EFTPOS but not cheques are to a degree as liquid as those accessible by cheque. However, banks set spending limits for EFTPOS withdrawals. As a result, these deposits are not a universal means of payment. Most spending using EFTPOS is from chequeable deposits and included in Transaction balances (cheque). The *M1* definition therefore incorporates most deposit balances widely used as a means of payment. A large proportion of non-*M1*, *M2* balances is accessible by EFTPOS and is recorded here.

Source: <http://www.rbnz.govt.nz/statistics/c3>

APPENDIX 2: SUGGESTED STUDENT ASSIGNMENT

Data for earlier periods can be difficult to find. Hence it may be necessary to provide historical data to students and require that they find the more recent data that is more readily available. Individual course instructors will need to make this decision for themselves.

For this assignment, you will need to find GDP data from the online Statistics New Zealand tool “Infoshare” (you can find the link on the Statistics NZ webpage <http://www.stats.govt.nz/>). You will also need to find monetary aggregates data from the Reserve Bank of New Zealand website (<http://www.rbnz.govt.nz/>).

1. Create a graph of the velocity of circulation (V) for notes and coins for 1961 to the most recently available time period.
2. What does a rise in V mean in terms of the demand for money? What does a fall in V mean?
3. From the start of the 20th century to around the middle (just before your graph starts) the velocity of circulation falls. Use economic concepts to explain this.
4. If done correctly, your graph should show a rising V from 1961 until 1989. Use economic concepts to explain this.
5. From 1989 your graph should show a declining V . Use economic concepts to explain this. (This period of time is actually challenging to explain because of what it implies about demand for money given what many people *think* is happening to the demand for money.)

APPENDIX 3: POSSIBLE DATA SOURCES

An index for *M1* and *M3* is available for a range of countries from <http://stats.oecd.org/>.

UK data:

- <http://www.bankofengland.co.uk/boeapps/iadb/index.asp?first=yes&SectionRequired=A&HidNums=-1&ExtraInfo=false&Travel=NlxSTx>
- <http://www.ons.gov.uk/economy/grossdomesticproductgdp>

Australian data:

- <http://www.rba.gov.au/statistics/tables/> (table D3)
- <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5206.0Jun%202016?OpenDocument>

New Zealand data:

- <http://www.rbnz.govt.nz/statistics/c1>
- <http://www.stats.govt.nz/>

US data

- https://www.federalreserve.gov/paymentsystems/coin_currircvalue.htm
- <https://fred.stlouisfed.org/series/GDPA>
- Earlier data for monetary aggregates can be found here <https://research.stlouisfed.org/wp/2003/2003-006.pdf> (page 48)

Many data items have multiple sources and the ones listed here may not be the best. Local knowledge is likely to be useful in this regard.