THE PROBLEM OF SYMPATHY-SEEKING PROJECTORS: ADAM SMITH'S SUPPORT OF USURY LAWS AS PRUDENTIAL CREDIT RATIONING

by

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Dedication

Without the constant support and patient encouragement of my wife this dissertation should not have been brought to completion; without my sons I would lack ready examples of innocent curiosity about the world and our place in it.

I credit my father, in whose example of scholarship I follow, and whom I most gladly imitate; my children will benefit from dear memories of youth and lessons learned if I prove half as loving and devoted a father as he. I credit my mother, she of the warmest conviviality of heart, with the frequent unburdening of my fatherly yoke, creating the time for me to work.

Ultimately my vocation is dedicated to St. Joseph, who in his role as protector of the Holy Family reminds me daily of the importance of dutiful submission to the interests of others.

> *Joseph, by the work of your hands and the sweat of your brow,*
> *you supported Jesus and Mary, and had the Son of God as your fellow worker.*
>
> *Teach me to work as you did, with patience and perseverance, for God and*
> *for those whom God has given me to support.*
> *Teach me to see in my fellow workers the Christ who desires to be in them,*
> *that I may always be charitable and forbearing towards all.*
>
> *Grant me to look upon work with the eyes of faith,*
> *so that I shall recognize in it my share in God's own creative activity*
> *and in Christ's work of our redemption, and so take pride in it.*
>
> *When it is pleasant and productive, remind me to give thanks to God for it.*
> *And when it is burdensome, teach me to offer it to God,*
> *in reparation for my sins and the sins of the world.*

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Abbreviations Used

WN	Adam Smith, Wealth of Nations
TMS	Adam Smith, Theory of Moral Sentiments
CORR	Adam Smith, Correspondence of Adam Smith
EPS	Adam Smith, Essays on Philosophical Subjects
LRBL	Adam Smith, Lectures on Rhetoric and Belle Lettres
DU	Jeremy Bentham, Defense of Usury

Abstract

THE TRANSFORMATION AND DECEPTION OF PROJECTORS

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George Mason University, 2021

Dissertation Director: Dr. David M. Levy

Economic analysis since the beginning of the 19th century has regarded the ‘projector’ as an entrepreneur: one who bears the cost of uncertainty by reorganizing the structure of production in order to reap benefits of that reorganization. In this paper we examine the preceding 2000 years of literary record to demonstrate that uncertainty and productive reorganization were not the sole concerns regarding projectors, but instead the concerns were focused on transparency, methods, and vice.

PROJECTORS AS CHIMERIAL MEN OF SYSTEM

Edward Austin Middleton, Ph.D

George Mason University, 2021

Dissertation Director: Dr. David M. Levy

Jeremy Bentham accused Adam Smith of inconsistency in his Defense of Usury, characterizing “projectors” as beneficial entrepreneurs who should not be prohibited from

borrowing at high rates of interest on the grounds that even their failures would lead to economic growth. A close look at Adam Smith's work finds that Bentham misunderstands Smith's argument; that narrowly defining projectors as entrepreneurs is inappropriately applied to the market institutions of the time; and that Smith develops and consistently applies a theory of market agency through his work that defends his advocacy of price ceilings in financial markets even as he rejects its application elsewhere.

WELFARE ENHANCING USURY RESTRICTIONS

Edward Austin Middleton, Ph.D; Christopher R. Fleming

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Chapter 3 uses a Constant Elasticities of Substitution function to model agents' internal relative utilities when presented with risks that potentially yield both reclusive and sympathetic rewards, converting the two sources of utility into a single-dimension willingness to pay. These agents offer interest rates as bids on investment funds depending on their perceived utility gain. Lenders maximize the loan portfolio's expected profits. Interest rate price ceilings are imposed on this market to compare aggregate performance among price ceiling regimes, and the process repeated. The results

demonstrate interest rate price ceilings theoretically may be efficacious at excluding sympathy-seeking agents from credit markets, improving overall economic growth.

Introduction

Anyone familiar with Smith's writing would recognize he was a close reader of Plato, and like Plato his work focused to a great degree on proportionality. This proportionality had two great consequences relevant to this current work: firstly, that any person, any institution, any idea must remain within its appropriate role in society in proportion to its usefulness and competence; secondly, and this is where Smith offered a consistent Platonic philosophy, that the person of the philosopher must understand his place in society and must consider his own limited imagination within his speculations rather than remaining above and outside the model.

The so-called "invidious name of Projector", as Jeremy Bentham deemed it, would have applied to Platonic philosophers whose primary tool was their imagination and their labor primarily speculation. It would have applied, too, to Adam Smith, for what else is the "obvious and simple system of natural liberty" elucidated in the Wealth of Nations but the product of an imaginative and speculative philosopher?

The test of Smith's introspection then becomes whether or not he was able to maintain his own sense of proportion about his system – a system which so caught his imagination he fell into a cesspit while absentmindedly strolling about Glasgow considering its implications – and about himself as the mouthpiece of that system. The primacy of proportionality aided Smith here: the man of speculation must temper his ideas with

experience; he must constrain his own theory, preventing it from expanding beyond propriety and the beyond the ability of society to accommodate it.

This dissertation explores one of the ways Smith constrains his otherwise enthusiastic treatise of self-regulated commercial order, namely, his opinion that statutory limits on discount rates for financial instruments were justified, both in their then-current state and in their general application. Using the analogy of party walls to prevent fire from spreading between dwellings, Smith believed limits on the rate of interest prevented the unwitting financial arsonist prodigals and projectors from spreading misery through commercial networks. His contemporaries were not in universal agreement: Jeremy Bentham accused Smith directly in "Defense of Usury" of inconsistently applying his own principles; some of the later editors of Wealth of Nations included comments stating baldly Bentham had corrected Smith's error.

The modern reading of Smith on usury is inherited from those 19th century economists who, like Bentham, believe Smith to have erred. While we allow that perhaps Smith did err, we find that over the course of the 250 years since Wealth of Nations was published we have forgotten the nature of the problem Smith wished to address in the imposition of price ceilings; that "projector" communicated far more to an 18th century Smith reader than it does a 21st; that impressed with Bentham's rhetoric as single-minded as a nail driven home by his characteristic wit accusing Smith of inconsistency, modern readers

forget Smith's guiding principle of proportionality, the application of which here is certainly consistent.

An examination of the lingual context of projector and its use in Smith's contemporary society would help us regain the understanding we've since lost; an examination of how Smith used the word in his corpus would present a picture of the danger he believed projectors posed in his time; modeling projectors within a simulated financial market would help test the conditions under which Smith's suggested remedy of a price ceiling might have the desired beneficial effects. These are the aims of this current work.

But even with a clear understanding of what was meant 250 years ago, the question of that understanding's relevance to us in our modern lives would remain: if Smith is constraining his system of natural liberty because of conditional and occasional social context, his modern opponents could easily respond that while his arguments might have had merit in a financially primitive pre-industrial Scotland, they bear no heed in a modern and globally-integrated financial network. Alternatively, the problem projectors present in financial markets may remain with us by way of being part and parcel of a constant human nature; and though the remedy of an interest price ceiling may no longer be a feasible solution, projectors may present a sufficient threat to merit a renewed search for remedy. In that case, Smith's example would retain its relevance, attempting as he did to empower commercial activity to improve the well-being of humanity while maintaining the constraining institutional party walls for the protection of the same.

The Transformation and Deception of Projectors

Economic analysis since the beginning of the 19th century has regarded the ‘projector’ as an entrepreneur: one who bears the cost of uncertainty by reorganizing the structure of production in order to reap benefits of that reorganization. In this paper we examine the preceding 2000 years of literary record to demonstrate that uncertainty and productive reorganization were not the sole concerns regarding projectors, but instead the concerns were focused on transparency, methods, and vice.

2.1 Introduction

The process of imbuing sounds with significance in language described by Adam Smith in Considerations Concerning the First Formation of Languages is a process which moves from the particular to the general.

> The particular cave whose covering sheltered them from the weather, the particular tree whose fruit relieved their hunger, the particular fountain whose water allayed their thirst, would first be denominated by the words *cave*, *tree*, *fountain*, or by whatever other appellations they might think proper, in that primitive jargon, to mark them. Afterwards, when the more enlarged experience of these savages had led them to observe, and their necessary occasions obliged them to make mention of other caves, and other trees, and other fountains, they would naturally bestow, upon each of these new objects, the same name, by which they had been accustomed to express the similar object they were first acquainted with.[1]

The experience of children's acquisition of language is similar: they first learn that "dada" and "mama" signify "father" and "mother"; but in their Smith-like attempt to generalize terms they err when they call other adult males "dada", and other adult females "mama", not yet knowing that, for them, those terms attain specifically and not generally. Later they will learn that while others have *their* dada, and *their* mama, these people are distinct from Dada and Mama. It is the particular child's family context which defines the meaning of those words: dada and mama. Outside of that context, those words lose – or at least they change – their meaning.

[1] Smith, LRBL, p. 203

Smith demonstrates his familiarity with the necessary relationship between usage context and meaning in his Review of Johnson's Dictionary, applauding Johnson's inclusions of references to works of literature, though complaining the arrangement of those references were insufficiently grammatical. Relying on the illustrative use of concrete examples, he juxtaposes Johnson's entries for "BUT" and "HUMOUR" with entries formatted in a manner Smith prefers.[2] The necessary relationship between context and meaning is revealed in a sentence of seeming praise towards the end of the review: "The dictionary presents [those under any difficulty with respect to a word or phrase] a full collection of examples, but by which the determination is rendered easy."[3] The plain reading of this sentence is that Johnson's plentiful examples make determining meaning easy; Smith's suggested entry for "BUT" has as its sixth use being synonymous with "except", which would reverse that meaning: The dictionary presents them a full collection of examples, except by which the determination is rendered easy. Smith illustrates with this "praise" that the lack of organizational specificity in Johnson's entries can serve to obscure meaning rather than illuminate it.[4]

[2] Smith, EPS, p. 232

[3] Ibid, p. 241

Klein and Lucas pick up on the irony of his review in *In a Word or Two, Placed in the Middle* (2011).

[4] It also occurred to your author that the combination of BUT and HUMOUR suggests "the butt of the joke", which appears as an entry BUTT in Johnson's dictionary. Considering Boswell's account that neither Smith nor Johnson cared much for each other in his Life of Samuel Johnson, it's entirely possible for this potentially hidden insult to have either precipitated or followed the ill-will.

For Smith nuances of meaning are necessarily tied to particular and concrete uses of a word.[5] Understanding prior uses constrains their present use; the application of a word to similar but not identical objects expands the range of meaning; disregard of former objects in application to new and dissimilar objects dilutes the specificity of contextual constraints; and, as in Smith's potentially ironic use of "but", lack of clear contextual constraints can cause a word to mean the opposite, thus obscuring meaning.

This dissertation contends that there was a loss of particular context surrounding the meaning and use of the word "projector" in the late 18th century, and identifies the inflection point within the economics profession as Jeremy Bentham's 1787 publication of Defense of Usury. Ignorance of this change in context leads modern economists to read pre-1787 Smith anachronistically with a post-1787 Benthamite meaning. This chapter will focus on the history of usage of projector and its Latin and French roots; the second chapter will look at the usage contexts of Smith and Bentham individually; the third chapter will look at an application of Smithian understanding of projectors to a credit market simulation.

This chapter will proceed as follows. In the second section we will look at the origins of the English word projector in the Latin; in the third we will look at its use in the French.

[5] He erroneously commented on the exclusion of Greek and Hebrew from Spanish university curricula, which prevented those studying to be priests access to the contextual meanings of the original scriptures, and accuses the Catholic Church of doing so to enable doctrinal drift subject to Rome's preferred interpretation. WN V.1.iii.2.21

In the fourth section we will examine the relationship between 'projectors' and 'projection' with chemistry and alchemy. In the fifth section we will narrow our focus to contemporary 18th century discussions, and the manners in which it was used. We conclude with a comparison of the 18th century understanding with the modern understanding inherited from the early 19th century.[6]

2.2: Origins in the Latin

'Projector' comes to us from the Latin *proicio*, "stretch out, throw forth". The past participle *proiectus* give us the verb 'project', "to plan", and the noun 'projection' via Middle French *projection* and the Latin *proiectionem*.[7] The Latin Dictionary of Lewis and Short, from which the bulk of the following classical citations draw, offer two literal definitions[8], the first as a general use: to throw forth; to fling away; or to extend. The actions described in these uses here are banal; for example, Virgil and Julius Caesar use *proicio* in reference to thrown weapons. We will return to uses of *proicio* in the general literal sense presently.

[6] A note on references: Because this chapter concerns both the meaning of words revealed in their usage context and the extent to which Adam Smith was aware of these contexts, each citation will indicate with an asterisk (*) after the author's name if some of their work was present in Smith's personal library as documented in Mizuta's Adam Smith's Library (2001). Two tables are presented in Appendix I referencing the relevant authors and entries in Mizuta.
[7] From Online Etymology Dictionary, "project"
[8] Lewis and Short "A Latin Dictionary" (1879)

For the second literal meaning in the particular, *proicio* takes on a normative weight absent in the general: to expel; to banish; to exile; to cast out. The normative weight comes as these verbs commonly refer to punishments for crimes of moral failure, treachery or treason. St. Jerome uses *proicio* ("*ne projicias me*") as his translation from the Hebrew in Psalm 50, line 12, where David asks God to create within him a clean heart, and not to cast him away from His face, presumably in response to David's presently unclean heart.[9] In Cataline's expulsion from Rome after an attempted coup, Cicero describes Rome as "rejoic[ing] at having vomited forth a pest, and cast it out of doors."[10] Seneca[11], Ovid[12], and Tacitus[13] each provide an instance of an individual being exiled as a punishment.

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[9] Vulgate of St. Jerome; Psalms 50.12-13*
Smith owned a copy of James Watson's 1722 Edinburgh Bible where the Vulgate's Psalm 50:12-13 is Watson's Psalm 51:10-11; this is in keeping with the numbering realignments between Catholic and Protestant bibles. He also possessed a text likely in the Latin "Novi Testamenti" (Mizuta 160), but no details are known. In Watson Ps 51:11 is translated, "Cast me not away from thy presence; take not thy holy sprit away from me." Smith was aware of the Vulgate, and spoke of it in WN 5.I.i in a discussion of university curricula, though his description of it (scripture was changed by the Church for motive; the Vatican declared it inerrant) reflects the broad anti-Catholic sentiment of Britain at the time.
This particular psalm had great significance for British subjects: it was the "Neck Verse", a recitation in Latin of which could save your neck from the noose by moving your case from civil to ecclesial courts, and the application of a brand to one's thumb. While only the first verse, *Miserere mei, Deus, secundum misericordiam tuam*, was required to be "read", the proximity to "cast me not from thy presence" is suggestive. See White "Legal Antiquities" (1913) Chapter 8.
Robert Alter's English translation of the Hebrew Bible (2018) has a footnote on Ps 51:13: "As elsewhere this Hebrew verb has a connotation of violent action for which the conventional translation of it as "cast" is too tame."
Alter translates it as "fling".
[10] Cicero* Against Cataline
[11] In De Providentia, Seneca* characterizes others thinking: 'Pro ipsis est' inquis 'in exilium proici, in egestatem deduci, liberos coniugem ecferre, ignominia adfici, debilitari?' [ASL 1505-1507]
[12] Ovid*, Metamorphoses. M.15.504 [ASL 1237]
[13] "nam senem Augustum devinxerat adeo, uti nepotem unicum, Agrippam Postumum, in insulam Planasiam proiecerit, rudem sane bonarum artium et robore corporis stolide ferocem, nullius tamen flagitii conpertum"
tr: "For she had gained such a hold on the aged Augustus that he drove out as an exile into the island of Planasia, his only grandson, Agrippa Postumus, who, though devoid of worthy qualities, and having only

The particular literal also includes a meaning referencing the architectural feature of masonry jutting out from the side of a building which is retained through to modern English usage.

The tropical offers three definitions. The first repeats the general literal sense of throwing away, but the throwing is done in the context of a normative judgement: it is a renunciation, as when Cicero in the Philippics believes Wisdom will enjoin you to cast away your life, fortune, and patrimony as a virtuous sacrifice in defense of society.[14] It is despair and the resignation of hope in the case of Pliny's account of Curtuis Rufus' final illness upon his return to Carthage.[15] It is Philomela's rejection of shame at her rape by Tereus, she intending to declare her impurity to accuse him of treachery, in Ovid's Metamorphoses.[16] In ten other examples (Rab; Caes; Horace; Tacitus; Cicero; Stat; Vergil; Luc; Caes; St. Jerome) either the individual casting the thing away is doing so because they are failing of virtue, or the thing being cast away is unworthy.

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the brute courage of physical strength, had not been convicted of any gross offence." Tacitus*, Annales; [ASL 1628-1629]

[14] Cicero*, Philippics 13.3.6

[15] Pliny*, Epistles 7.27.3 [ASL 1328-1330]

[16] Ovid*, Metamorphoses 6.545

Two translations of this passage offer different nuances on the use of *proiecto*: B. Moore (1922) translates it as, "Yea I my selfe rejecting shame thy doings will bewray." Here Philomela casts away the shame of rape. Arthur Golding (1567) translates the phrase, "I shall declare your sin before the world, and publish my own shame to punish you!" Here Philomela is not casting shame as fetters on her action, but casting it forth for others to see. In either case, she disdains concealing his crime to conceal her own violation.

The second tropical definition is reflexive, and the uses here universally condemn the subject of error: *se proicio* implies that the individual is rushing himself into something without due consideration, as how Cicero condemns the "perilous influence of unscrupulous" accusers of Marcus Caelius who thrust themselves into the judges' chambers.[17] It implies that the individual degrades one's self and gives into vice, as Livy relates Lucius Marcius' remonstration of his troops "giving themselves up to womanish and unavailing lamentations" in the face of oncoming Carthaginians.[18] Sallust relates Adherbal's plea to the Roman senate for help against his rival Jurgurtha, complaining it was Jurgurtha's "impious crime" that has "subjected [him] to these woes".[19] Cicero warns against obtruding one's self as vice runs riot (*se proiciet*):

> Again, if modesty, self-control, chastity, if in a word Temperance is to depend for its sanction on the fear of punishment or of disgrace, and not to maintain itself by its own intrinsic sacredness, what form of adultery, vice or lust will not break loose and run riot when it is assured of concealment, impunity or indulgence.[20]

The third tropical definition regards dealing with time; putting something off or procrastinating. Tacitus uses *proicio* in this way in the conversation between Gallus and Tiberius over the subject of delaying election to praetorship for five year intervals.[21] Tiberius' stated concern was that such a delay would incite hatred in the men waiting for promotion.

[17] Cicero*, For Marcus Caelius, tr: C.D. Yonge (1891) 9.22
[18] Livy*, History of Rome, 25.37.10 [ASL 1010-1011]
[19] Sallust*, Belli Jurgurthini 14.21 [ASL 1474-1476]
[20] Cicero*, de Finibus, 2.22.73
[21] Tacitus*, Annals 2.36

The tropical definitions' normative connotations help us understand not only that something or someone is being cast away, but why it is being cast away: as punishment for vice, by vice humiliated, or into vicious circumstances.

With the normative connation of the tropical in mind we return to the cited instances of *proicio* used literally and examine the context surrounding that action of throwing. As one might expect, Julius Caesar describes Vercingetorix's armies throwing stones[22] and pitch[23], and commands Pompeii's defeated forces to throw down their weapons[24]. Livy similarly describes a Gaul holding forth a shield in combat with a Roman[25]. But these four instances alone are without normative context.

Julius Caesar also uses *proicio* to describe Gallic ambassadors who threw themselves in front of him to grovel for mercy[26], in the same way Livy describes defeated Syracusan legates throwing themselves before Marcellus[27]. Fear caused armies to surrender[28] and throw down their arms[29]. After Domitius flees, his captains discuss the dire straits into which they've been thrown[30].

[22] Caesar, Gaius Julius*, Bellum Gallicum 7, 81; [ASL 276-278]
[23] Caesar, Gaius Julius*, Bellum Gallicum 7, 25
[24] Caesar, Gaius Julius*, Bellum Civile 3, 98
[25] Livy*, History of Rome, 7, 10, 9
[26] Caesar, Gaius Julius*, Bellum Gallicum 1, 31
[27] Livy*, History of Rome, 26, 32, 8]
[28] Bellum Gallicum 7, 40
[29] Bellum Gallicum 8, 29
[30] Bellum Civile 1, 20

Several times corpses were thrown out via *proicio*: Varro tells of putrescent bodies being removed in such a way from the public burial site because of their stink[31]; Pleminius tortures and kills tribunes who had (unsuccessfully) falsely accused him, denying them burial to punish them further in the afterlife and instead throwing their bodies out in the open[32].

Personal degradation is demonstrated: an old soldier whose estate and possessions had been taken by creditors for unpaid debts incurred while he was serving Rome in war rushed into the forum in such a pathetic state, it roused anger in others, commenting that citizens were abusing citizens worse than the enemy had[33]. Venus threw pieces of bread at Psyche while accusing her of prostituting herself to avoid household chores[34]. The voice thrown forth "filled the wood with fearful yelps", as Horace called his opponent a cowardly dog among wolves[35].

The word was not always used to reference cowardice: Caesar's *proicio* also demonstrates courage, as one standard-bearer who acts to save the legion's eagle though he is slain[36], and another who leaps from his ship with the standard encouraging his fellows to take heart in the attack[37]. Aenesidemus, as a contrast to Domitius, understands

[31] Varro*, De Lingua Latina 5, 25 [ASL 677-678]
[32] Livy*, History of Rome, 29,9,11
[33] Livy*, History of Rome, 2,23,3
[34] Ovid*, Metamorphoses 6:10
[35] Horace*, Epodes 6, 10 [ASL 811-823]
[36] Caesar, Gaius Julius*, Bellum Gallicum 5, 37
[37] Caesar, Gaius Julius*, Bellum Gallicum 4, 25

that his forces will be destroyed, but sues for peace to allow his warriors to depart; after they'd departed, he held his ground because he would not renounce his duty to protect Argos from the Thracians[38]. He held forth his shield and he was slain by thrown Thracian spears.

Horace uses *proicio* to contrast the miser's vice to the Greek Aristippus' virtue; while traveling in the desert he directed his slaves to throw out the gold that was weighing them down[39]. Virgil as well demonstrates virtue with *proicio*: Eryx threw weighted gloves in response to a challenge from a young braggart[40]; Anchises tells Aeneas to throw away his sword and be merciful while watching a procession of hard-hearted and brutal warriors through Hades[41]; Nisus flings his mortally wounded body on that of Eurylaus after slaying Volcens, content in achieving in a good death[42].

These prior examples provide ample evidence for the use of *proicio* in the late Republic and early Empire of Rome; St. Augustine provides one in the 4th century. In his Rule regarding the organization and administration of religious communities, Augustine leans on the model of fraternal correction found in Matthew[43], which instructs Christians to correct others always with the aim to convert them away from sin. St. Augustine writes:

> But if he fails to correct the fault despite this admonition, he should first be brought to the attention of the superior before the offense is made known to the

[38] Livy*, History of Rome, 32, 25, 12
[39] Horace*, Satires, 2,3,100
[40] Vergil*, Aeneid, 5, 402
[41] Vergil*, Aeneid, 6, 835
[42] Vergil*, Aeneid, 9, 444
[43] St. Jerome, Matthew 18:15-17*

> others who will have to prove his guilt, in the event he denies the charge. Thus, corrected in private, his fault can perhaps be kept from the others. But should he feign ignorance, the others are to be summoned so that in the presence of all he can be proven guilty, rather than stand accused on the word of one alone. Once proven guilty, he must undergo salutary punishment according to the judgment of the superior or priest having the proper authority. If he refuses to submit to punishment, **he shall be expelled** from your brotherhood even if he does not withdraw of his own accord. For this too is not done out of cruelty, but from a sense of compassion so that many others may not be lost through his bad example.[44]
> [**Emphasis** added]

This expulsion is an excommunication – a removal from communion with the religious community. As with other excommunications, the penalty is imposed as an outward expression of the inner reality of an absence of communion in the hope that the outward expression converts the errant to ask for forgiveness.[45] The *proicio* is imposed in response to a member of the religious community refusing to admit his own moral failure, and refusing to submit to the community to which he'd made vows.

What these examples show is that projector, whose root is the Latin *proicio*, was consistently, if not universally, associated with normative moral judgement, either directly in the rushed manner in which an activity has been done, in the transformative way the activity degrades the person, or in the way the projection demonstrates contempt for that which was projected. Familiarity with the Latin corpus would introduce this

[44] Rule of St. Augustine, 4.9
[45] Encyclopedia of Theology: A Concise Sacramentum Mundi (1975) p. 413

normative connotation to the 18th century reader, and support a conclusion that the English-language projector was someone with particular moral failings[46].

2.3: Uses in the French and the English

Projectors were of greater concern for the British than *projetters* were for the French: a comparison of frequency of use in respective literatures demonstrates the word had a much tighter hold on the British imagination than the French.

Figure 1.1 shows the relative French usage of *projetter* in the 18th century, peaking near the end at 0.00005% of all words digitized by Google.

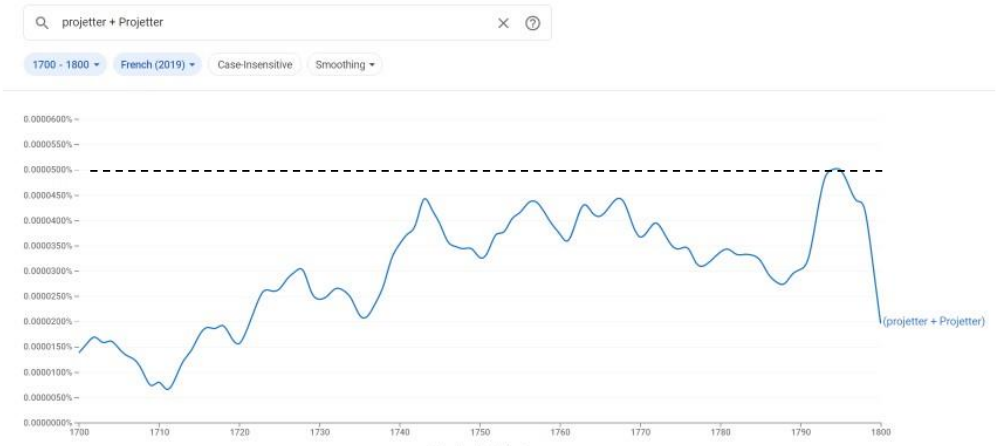

Fig. 1.1: Ngram Use of projetter in the French, 1700-1800

[46] Hiroshi Mizuta's "Adam Smith's Library" (2000) records that works from each of the Latin authors mentioned above, save Augustine, were possessed by Smith.

Figure 1.2 shows the the relative English usage of projector in the 18th century, coming to prominence in the mid-century. The dashed line approximates peak French usage at 0.00005%.

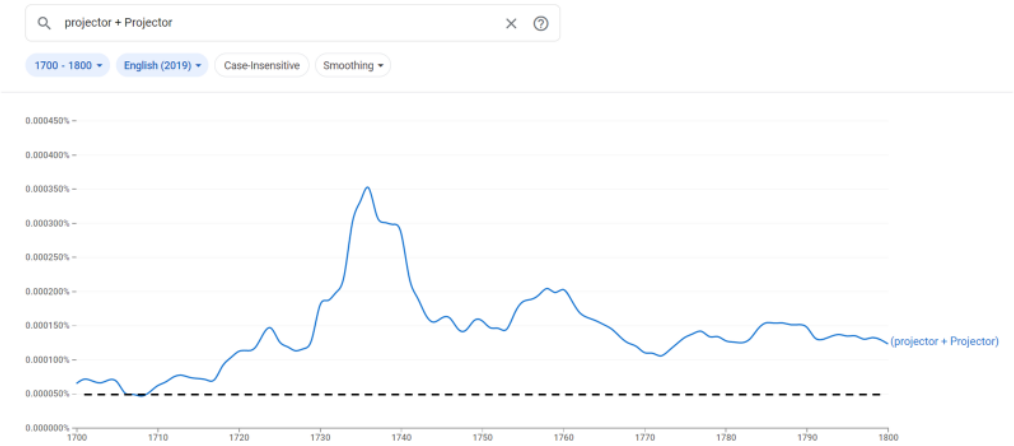

Fig. 1.2: Ngram Use of projector in the English, 1700-1800

Case-sensitivity seems to be a driver for trends in Britain, but not in France. While the capitalized *Projetter* is negligible, shown in Figure 1.3, the capitalized Projector comes to prominence earlier in the English before trailing off, and may be seen in Figure 1.4.

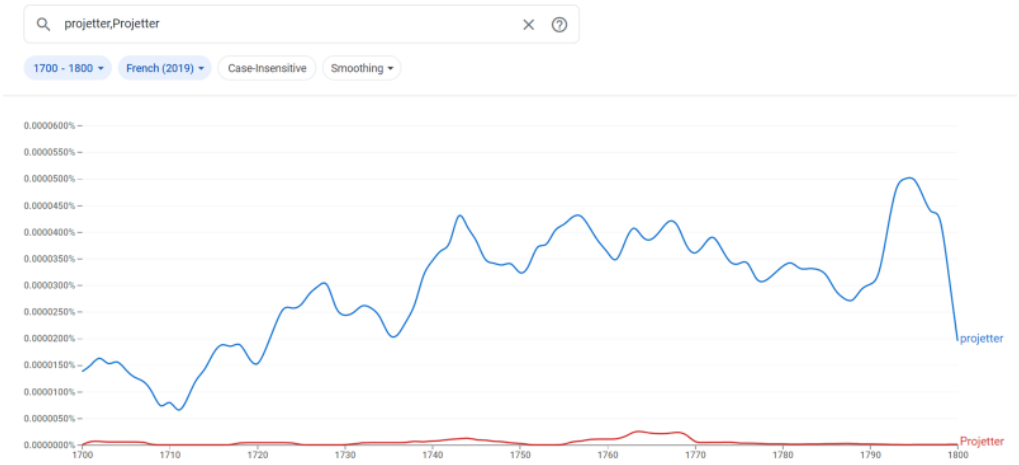

Fig. 1.3: Ngram Use of Projetter vs projetter in the French

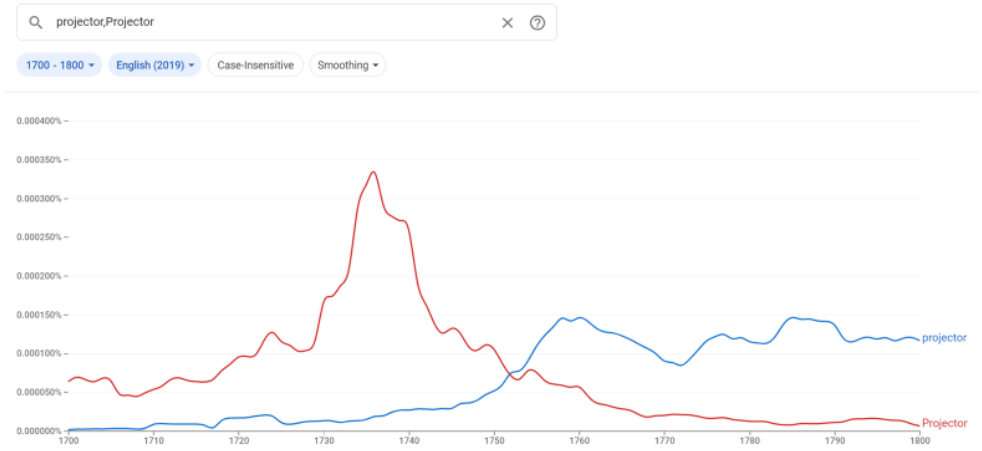

Fig. 1.4: Ngram Use of Projector vs projector in the English

The peak of Projector is in 1736; we attribute the timing of this peak to several publications in the years proceeding. Daniel Defoe's The Dumb Projector (1725) and The Generous Projector (1733) recalled his earlier Essay upon Projects (1697); Philip

Stanhope's poem "The State Screen Display'd: or the Projector at his last shift" (1734) recounts Robert Walpole's tax reform defeat in Parliament; as does "The Projector's Looking-Glass" (1733) by the pseudonymic Sir Robert Marral; Joseph Addison's publications in The Gentlemen's Magazine, or The Monthly Intelligencer included references to Projectors. After its peak the frequency of Projector goes into permanent decline while projector increases into the 19th century.

Two possible phenomena explain this change in usage. Firstly, that English publication standards changed over the mid-18th century, which wouldn't be surprising given its relative infancy. Secondly: because Robert Walpole remains the British Prime Minister with the longest uninterrupted tenure; and because his administration frequently turned their efforts to reforming the system of British revenue and the permissibility of stock trading; and because, as we shall see, the term projector was applied to, among others, those who designed tax policy and traded in stock markets; Walpole may have been satirized as *the* Projector. After he left office, satire aimed at him would have ceased and the frequency of Projector in print would decline. Walpole's decline in influence in the late 1730's to his resignation in 1742 correspond to the decrease in frequency of Projector. Figure [5] imposes Walpole's tenure on the frequency of capitalized-Projector appearance in print.

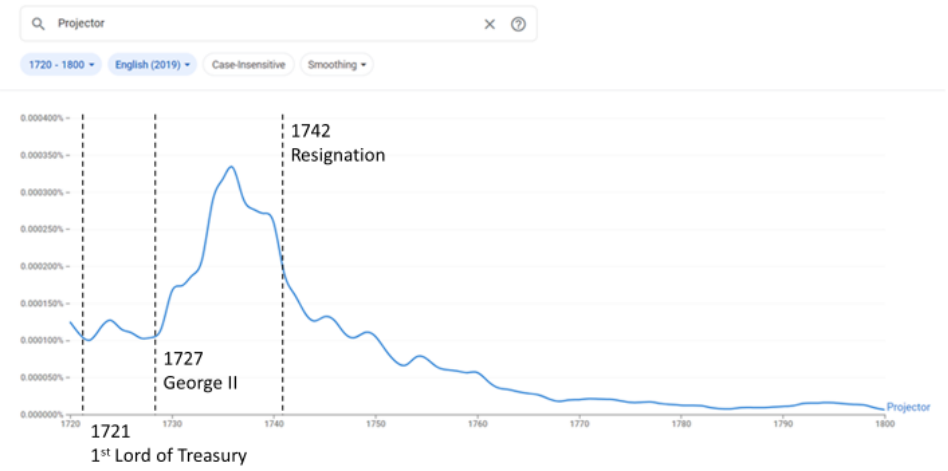

Fig. 1.5: Ngram Use of Projector during Walpole's career

The increase in frequency in 1727 corelates with George II's ascension to the British throne, and Walpole's domination of the Whig party to the disaffection of cohorts Charles Townshend, 2nd Viscount Townshend, his former co-equal at the beginning of Walpole's tenure in 1721, particularly William Pulteney, 1st Earl of Bath[47].

If this second explanation is true, it would be an example of a denotation applied to a specific phenomena before becoming generalized, corresponding to Adam Smith's theory of how societies develop language, appended to all editions of Theory of Moral Sentiments published in his lifetime. [48]

[47] The 1st Earl of Bath's first cousin once removed, Frances Pulteney, married Sir William Johnstone; Johnstone took his wife's name and it was this William Pulteney who was friend and correspondent to Adam Smith.
[48] Adam Smith's Essay on Languages, EPS

Relevant 18th century meanings of projector seem tied more to usages in the English than uses in the French. Nevertheless, we feel Denis Diderot provides a useful description of the projector in his *Encyclopedie*, particularly compared to the terse treatment in Samuel Johnson's contemporary A Dictionary of the English Language.

Diderot's entry for *projetter* is concise, but it directs the reader to the preceding discussion of *projet*, and it is there we will turn our attention.

> *Projet, Dessein, (Synonymes.) [Synonymes] unknown (Page 13:441)*
> *Projet, Dessein, (Synonymes.)*
>
> *Le projet est un plan, ou un arrangement de moyens, pour l'exécution d'un dessein: le dessein est ce qu'on veut exécuter.*
>
> *On dit ordinairement des projets, qu'ils sont beaux; des desseins, qu'ils sont grands.*
>
> *La beaute des projets dépend de l'ordre & de la magnificence qu'on y remarque. La grandeur des desseins dépend de l'avantage & de la gloire qu'ils peuvent procurer; il ne faut pas toujours se laisser éblouir par cette beauté, ni par cette grandeur; car souvent la pratique ne s'accorde pas avec la spéculation; l'ordre admirable d'un système, & l'idée avantageuse qu'on s'en est formée, n'empêche pas quelquefois que les projets n'échouent, & qu'on ne se trouve dans l'impossibilité de venir à - bout de son dessein.*
>
> *L'expérience de tous les siecles nous apprend que les têtes à grands desseins & les esprits féconds en beaux projets sont sujets à donner dans la chimere.*
>
> *Le mot de projet se prend aussi pour la chose même qu'on veut exécuter, ainsi que celui de dessein. Mais quoique ces mots soient alors encore plus synonymes, on ne laisse pas d'y trouver une différence, qui se fait sentir à ceux qui ont le goût fin & délicat. La voici telle que l'abbé Girard a pu la développer. Il lui semble que le projet regarde alors quelque chose de plus éloigné; & le dessein quelque chose de plus près. On fait des projets pour l'avenir: on forme des desseins pour le tems présent. Le premier est plus vague; l'autre est plus déterminé.*
>
> *Le projet d'un avare est de s'enrichir, son dessein est d'amasser. Un bon ministre d'état n'a d'autre projet que la gloire du prince & le bonheur des sujets. Un bon général d'armée a autant d'attention à cacher ses desseins, qu'à découvrir ceux de l'ennemi.*
>
> *L'union de tous les états de l'Europe dans un seul corps de république, pour le gouvernement général ou la discussion des intérêts, sans rien changer néanmoins dans le gouvernement intérieur & particulier de chacun d'eux, étoit un projet digne de Henri IV. plus noble, mais peut -*

être aussi difficile à exécuter que le dessein de la monarchie universelle, dont l'Espagne étoit alors occupée. Synon. de l'abbé Girard.[49]

The project is a plan, an array of means for the achievement of an objective.

Usually it is said of the projects, they are beautiful; the designs, they are great.

The beauty of projects depends on their orderly conception & magnificence that one would notice. The greatness of plans depends on the advantage & the glory they can secure; one should not always be dazzled by their beauty or grandeur; because often the implementation does not accord with expectations; the admirable order of a system, & the ideas about the system that people formed do not prevent projects from failing, & one finds the impossibility of reaching an end to what was planned.

The experience of all ages teaches us that those with great designs & the fertile minds behind beautiful projects give rise to chimera.

The word project is something you want to execute, as well as a plan. But even though these words are synonyms, there is a difference for those with refined taste. It is such that the Abbe Girard has seen to develop. It seems to him that the project pertains to something more distant; & the plan to something closer. The first one is more vague; the other one more precise.

The project of a miser is to get rich, his purpose is to amass. A good minister of state has no other project than the prince's glory & the happiness of the subjects. A good army general takes as much care to hide his plans, as he does to discover his enemy's.

The union of all the states of Europe into one body of republic, for the general government or the discussions of interests, without changing anything in the domestic policy of either government was a conception worthy of Henry IV. more noble, but maybe as difficult to execute than that of the project of the universal monarchy, which Spain was then embroiled in trying to accomplish. Synonym de l'Abbe Girard.[50]

PROJETTER, v. act. (Gram.) former un projet. Voyez l'article Projet. Il est rare que nous apportions une attention & une sagesse proportionnée à la difficulté & aux obstacles des choses que nous projettons. Pour une fois, où ce que nous appellons le hasard, fait manquer notre projet, il y en a cent où c'est la maladresse; nous sommes plus souvent

[49] Diderot*, Encyclopedie, entry 13:441
[50] Translator: Michèle Miller

imprudens ou gauches, que malheureux.

> PROJECTER : v. act. (Gram) To form a project. It is rare that we would dedicate an attention & wisdom in proportions to the difficulty and obstacles of things that we project. For once, what we called hazard that makes our project fail, there are a hundred more that fail also due to clumsiness. Often we are more unwise and awkward than unfortunate.[51]

Diderot had quite a few concepts bundled into his entry. Projects possess greatness, beauty, and magnificence according to their magnitude; the size of projects consciously attend upon the glory they will receive upon success; projects denote the ends, but not the means of attaining those ends according to Abbe Girard; the chimera – the impossible fancy of imagination – influences projects' designs[52]; risk comprehends only a small proportion of projects' failures whereas most failures are due to the optimism or myopia of projectors; projectors are not a specific race of men, but rather projecting is an action taken by all manner of men: misers, statesmen, and generals.

The contrast with Johnson's stark "wild, impracticable schemes" could not be more stunning. Diderot embraces the nuances of planning, execution, vision, and imagination in a way that should have pleased Smith; after all, Smith's major criticism of Johnson's method was his treatment of apparent synonyms: "The different significations of a word are indeed collected; but they are seldom digested into general classes, or ranged under the meaning which the word principally expresses. And sufficient care has not been taken

[51] Translator: Michèle Miller

[52] For a fuller discussion of the Chimera and Projectors, see Middleton, Projectors as Chimerical Men of System, 3.3.i, p.58

to distinguish the words apparently synonymous."[53] This criticism echoes Diderot's praise for Abbe Gabriel Girard's "fine and delicate taste" in distinguishing synonyms, and also in Smith's recommendation of the Abbe's work[54] to a work proposed to an aspiring grammarian.[55]

Much of the rich meaning attendant upon projector was stripped out in 1755 with the publication of Samuel Johnson's Dictionary of the English Language. All that remained were the antiseptic, "One who forms schemes or designs; one who forms wild impracticable schemes." Among the other words associated with projector (project, conceit, scheme, contrivance, plot), none share the connotation of wildness or improbability. The common link between the words is a systematic exercise of one's imagination. These definitions of projector remain constant through the 18th century and well into the 19th. The modern usage of scheme echoes the 18th century's dual meaning of project and projector: the defensive scheme of an American Football team denotes the systematic arrangement of players trying to prevent the offense from advancing the football; a schemer is one who devises underhanded or illicit plans for his own gain. Nevertheless, Johnson does retain an important characteristic of the schemes of projectors: an increased risk of failure.

[53] Adam Smith, EPS, Review of Johnson's Dictonary, p. 232
[54] Abbe Girard, Les vrais principes de la langue francoise, ou la parole reduite en method, conformement aux lois d'usage, en seize discours, 1747
[55] COR, George Baird, no. 69, 7 Feb 1763

2.4: Projectors and Alchemy

Chronologically, after the Latin of St. Augustine's *proicio*-cognate of expulsion, the projector finds a new home in alchemy, and this sense is retained in the Latin for as long as that language remained the language of scholarship; it also found a home in the vernaculars of French and English. The link with the Latin is through the action of the alchemist, who casts a powder (often called the 'powder of projection') onto molten metal in order to cause a transformation[56].

Diderot's *Encyclopedie* is again useful here; Paul-Jacques Malouin, the author of the *Encyclopedie's* early articles on chemistry, draws the distinction between alchemy and chemistry, and also between legitimate and illegitimate alchemists.

> Alchemy is chemistry of the subtlest kind which allows us to understand extraordinary chemical operations executing at a more rapid pace those things that require a long time for nature to produce; as for example when, starting with mercury and sulfur alone, in only a few hours we can make a solid red material called cinnabar that is in every way identical to natural cinnabar that requires years and even centuries for nature to produce.
>
> Alchemical operations are endowed with admirable and mysterious traits; we must note that as these operations become better known they lose their unusual character and are then classified as ordinary chemical operations, as has been the case with lilium, panacea, the kermes mineral, emetics, scarlet dye, etc., and in the same way that things usually work in human affairs, chemistry has shamelessly appropriated the advantages it has gained from alchemy; alchemy has been maligned in most chemistry books.

[56] Online Etymology Dictionary "projection"

The word alchemy is composed of the Arabic preposition al meaning sublime or par excellence and of chemistry , which we will define at the appropriate place. See Chemistry. Therefore, based on the word itself, alchemy means sublime chemistry, chemistry par excellence.

Historians haven't agreed on the origin or the age of alchemy: if we are to believe various fabulous tales, it's been around since the time of Noah. And some even claim that Adam knew something about alchemy.

As far as the age of this science is concerned, we find no records among the ancient authors, whether they be Doctors, Philosophers, or Poets from Homer up through the fourth century of the Common Era. The first author to speak of making gold is Zosimus, who lived around the beginning of the fifth century. He wrote in Greek a Book *Sur l'art divin de faire de l'or et de l'argent*. The Manuscript is in the King's Library. This work suggests that by the time it was written chemistry had been practiced for a long time since it has progressed so far.

Nobody speaks about a universal remedy, alchemy's main goal, before Geher, an Arab author who lived during the seventh century.

Suidas claims that the reason there remain no earlier books about Alchemy is that the Emperor Diocletian had all the Books of the ancient Egyptians burned, and it was those Books that held Alchemy's mysteries.

Kirker asserts that the theory of the Philosopher's Stone is explained at length in the table of Hermes and that the ancient Egyptians were well aware of it.

We know that the Emperor Caligula made attempts to extract gold from orpiment. That fact is reported by Pliny, Hist. Nat. ch. Iv. Liv. XXXIII . Such an operation would not have been possible without knowledge of Chemistry that goes beyond that needed for most procedures and experiments in which fire is used.

Furthermore, the earth is so old, and there have been so many revolutions, that there remain few reliable documents showing what the sciences were like in the era preceding the past twenty centuries. I offer only one example: Music was elevated to a point of high perfection at one time by the Greeks; it was so much more advanced than our own, if we judge by its effects, that we have difficulty understanding it. And people would not hesitated (*sic*) to doubt that assertion were it not proven by the singular attention that the Greek government paid to it and by the guarantee of several trustworthy contemporary authors. See *An sanitatem musice*, written by M. Malouin. Published in Paris by Quillau, Galande Street.

> It's also possible that Chemistry was also perfected to such a point, that in Chemistry things we can't do today used to be feasible and that we can't now understand how they might have been accomplished. Chemistry raised to such perfection is what we call Alchemy. That science, like all others, perished during certain times and remains now in name only. Later, those with a taste for Alchemy suddenly started to perform operations whose reputation shows that Alchemy has some success; they also bypassed what was known in their search for the unknown: they didn't start by doing Chemistry, and without Chemistry one can become an Alchemist only by chance.
>
> One thing that stands in the way of progress in this science is that Chemists, or those who work from laws, believe that Alchemy is an imaginary science in which they must not dabble, and Alchemists on the other hand believe that Chemistry is not the path they should follow.
>
> The life of any one man, or even a century, is insufficient for perfecting Chemistry; we can say that Beker's era is the time when Chemistry as we know it began. It has since progressed during Stalh's time and others have added to it since then. However it is still far from what it once was.
>
> The principal authors of Alchemy are Geber, Le Moine, Bacon, Riply, Lulle, Jean le Hollandois, Isaac le Hollandois, Basile Valentin, Parcelsius, Van Zuchten, Sendigovius, etc.[57]

The distinction between chemistry, and both legitimate and illegitimate alchemists are taken up in the entry for Alchemists.

> Alchemist, one who practices Alchemy. See Alchemy. Some ancient Greek authors used the word χρυσοποιητὴς which means maker of gold, to say Alchemist, and the word χρυσοποιητικὴ, which means the art of making gold, when describing alchemy. In other Greek books we find, ποιητὴς, fictor, maker, Alchemist, which can also mean Maker of verses, Poet. There is actually some similarity between chemistry and poetry. According to Mr. Diderot, page 8 of Prospectus in this dictionary: Chemistry is nature's imitator and rival; its object is almost as broad as that of nature herself: this part of Physics is among the others, just as Poetry is among the other genres of literature; either it decomposes beings, or it vivifies them, or it transforms them, etc.
>
> We must distinguish between legitimate, fraudulent and insane Alchemists. **Legitimate Alchemists are those who**, after having worked with the ordinary

[57] Encyclopedie, Vol. 1 (1751), pp. 248–249, Author: Paul-Jacques Malouin; Tr: Lauren Yoder

Chemistry of Physicists, **push their research further, working methodically and by principle** with curious and useful combinations, by which the works of nature are imitated, or simplify these works for man's use: be it by giving them some particular perfection, be it in adding pleasures that, although artificial, have the potential to be more beautiful than those that come from plain nature devoid of art, provided that these artificial pleasures have a natural origin, and imitate nature in its beauty.

By contrast, **those who**, knowing nothing about ordinary Chemistry, or even lacking superficial knowledge, **launch themselves into Alchemy with neither methods nor principles, reading only enigmatic books that they prize all the more insofar as they understand them less, are the fake Alchemists**, who lose their time and their fortunes, because working without proper knowledge, they never find what they are looking for, and spend more than if they were knowledgeable, because they employ so many useless techniques and do not know how to save certain materials that can be extracted from failed operations.

Besides, **they have as much taste for swindlers as for enigmatic books**: they do not care about a good book that speaks clearly, **but instead read enigmatic books that flatter their greed but teach us nothing, and to which people obsessed with the fabulous, or at least the mysterious, attribute whatever meaning they wish to find and whatever is more in line with their imagination; thus these fake Alchemists grow bored with the speech of a scientifically educated man, which reveals, and which reduces their operations to their true value: they will listen more willingly to men who are really just as ignorant as they are, but who make a living by exciting their curiosity**.

It is always important, especially when dealing with things of this nature, to avoid the extremes: one must be equally wary of superstition and incredulity. To say that Alchemy is nothing but a science of the delusional, and that all Alchemists are either insane or imposters, is to judge unfairly a legitimate science to which sensible and honest people may apply themselves: but one must also protect oneself from of a sort of fanaticism, to which those who practice this science without discernment, guidance or prior knowledge, in a word, unprincipled, are especially susceptible. The principles of science are known facts; one must pass from the known to the unknown: if in Alchemy, as in the other sciences, we pass from the known to the unknown, we can derive as much, or more utility than we can from certain other ordinary sciences.[58]
[**Emphasis** added]

[58] Encyclopedie, Vol. 1 (1751), p. 249; Author: Paul-Jacques Malouin; Tr: Michael Jones

We might be able to lift the bolded sections of the above and compare them to the accusations leveled at financial projectors: they were subject to imaginary chimeras; their designs were grand and revolutionary; they were detached from or disregarded methodical practice. It is the last, the small gains made methodically over time, which identifies the legitimate alchemist; that is to say, theoretical inquiry need not be detached from experimentation.

Donald Livingston observes how David Hume levels similar faults at those who practiced "philosophical chymistry":

> According to Hume, the philosophical act of thought is structured by three principles: ultimacy, autonomy, and dominion. First, philosophical claims purport to provide an unconditioned understanding of what is thought to be ultimately real. Second, philosophy is autonomous, i.e., self-determining. The philosopher cannot (without ceasing to be a philosopher) defer to the *pre-reflective authority* of custom, tradition, or to the dogmas of priests and poets. Third, philosophical claims about the real, grounded in the philosopher's autonomous reason, have a title to rule over the domain of the pre-reflective. As Plato said, philosophers should be kings.
>
> What Hume discovered is that these principles of philosophic reason are incompatible with human nature. When cut loose from the authority of the pre-reflective, they are indeterminate and can establish no judgment whatsoever. But philosophers typically do not recognize this; instead, they secretly smuggle in their favorite prejudices from pre-reflective custom and pass them off as universal principles entirely free from the authority of custom. In doing so they deceive themselves and others. And since the aim of philosophical truth is *self-knowledge*, this form of philosophic reason is *false* in the sense of being self-deceptive.
>
> There is more. The false philosopher not only smuggles in a favorite part of custom in violation of the autonomy principle, but he spiritualizes that part into the whole of experience: "When a philosopher has once laid hold of a favorite principle, which perhaps accounts for many natural effects, he extends the same principle over the whole creation, and reduces to it every phenomenon, though by

> the most violent and absurd reasoning." Thales taught that all is really water; Proudhon that "property is theft"; Marx that all history is class struggle; Hobbes that love of others is really self-love. Here the philosophic act is engaged in *world-inversion*, what Hume calls "philosophical chymistry," i.e., alchemy. Just as the alchemist can transform base metal into gold, and King Midas could transform everything he touched to gold, so Proudhon can transform the inherited order of property into theft, and Marx all of history into class struggle. In so doing the false philosopher is a worker in black magic: "Do you come to a philosopher as to a *cunning man*, to learn something by magic or witchcraft, beyond what can be known by common prudence and discretion?"[59]

By clothing himself in the trappings of formalized and legitimized inquiry, the philosopher-alchemist-projector detaches himself from the grounding provided by experience and allows him to make claims about the world, or about how the world will react, to an innovation of his own.

There is also a difference in audience between the legitimate and illegitimate alchemists. Nummedal records the complaints official court-appointed alchemists had regarding street practitioners of alchemy, the latter of whom were called "projectors", not alchemists, as they dramatically performed transformations by throwing powder into a false-bottomed crucible before a crowd.[60] Two features of this distinction between court alchemist and street projector are worth noting: firstly, because the court alchemist is subsidized by the crown, he is relieved to some degree from producing immediate results; indeed, if all he produces is a record of what doesn't work, he may be considered a

[59] Livingston, "David Hume and the Conservative Tradition", website: https://isi.org/intercollegiate-review/david-hume-and-the-conservative-tradition/

[60] Maier, Examen Fucorum et Pseudo-Chymicorum; "Alchemy and Authority in the Holy Roman Empire" Tara Nummedal

success. The street projector is different: his audience, because it is evanescent, must be provided with some immediate result. The difference in audience changes the incentives facing the practitioner. Secondly, the audience possesses different knowledge characteristics. The court alchemist will, more likely, be demonstrating his work before other knowledgeable alchemists; he will also likely be demonstrating to the same audience repeatedly. Because of these reasons he will be more inclined to methodical record-keeping for replication and reputation purposes. The street projector's audience of passers-by possess neither deep knowledge of the principles of alchemy nor the expectation for repeated interactions generating a robust reputation mechanism.

Here the objections to alchemical projectors mirror almost exactly the objections to public stock companies: the buyers of stock possessed little of the knowledge required to carry out the operations of these businesses, and were therefore in a poor position to judge the prudence of those seeking finance; stock market institutions of the time possessed weak reputation mechanisms, except to the extent landed aristocrats were willing to stake their estates behind particular ventures.

2.5: The Projector in 18th Century British Use

In this section we will offer a chronological account illustrating the variety of ways projector was used in published works in the English.

1640's

The earliest uses of projector were found in satirical works and theatrical productions.[61] Thomas Brugis' "Discovery of Projector" satirizes the Sturteveant's claims in "Metallica" that projectors provide a beneficial service, but the essence of Brugis' criticism is that he believes Sturteveant, and by extension other projectors, seek not to profit by invention, but profit by attaining exclusive privileges; the fabrication of taxonomic distinctions between inventions allows Sturteveant to justify such privileges. Brugis was leveling perhaps the first accusation of patent trolling.[62] Though rent-seeking through patent privileges was a central part of Brugis' story, a projector was nevertheless an individual who did so by means of mechanical invention and improvement.

John Wilson's play "The Projectors" levels similar accusations at the methods of projectors, but deception plays a larger role.[63] One of the characters asks another if he can cant; that is, is he able to speak in the jargon of vagabonds, thieves, and beggars.[64] In order to be a successful projector, one must be able to present seeming profitability; one must create a vision in the mind of he whom the projector seeks to take advantage of. The projector's ability to deceive relies on sight; or rather, the limitations of sight.

It is important to point out that at this time the actions of projectors and financiers were separate – though there was no love lost for financiers on either Brugis' or Wilson's

[61] Ratcliff, J. (2012)
[62] ibid
[63] ibid
[64] Oxford English Dictionary, "cant"

parts, the monied men were most often the ones deceived; Wilson's character Suckdry, a usurer, is scammed into investing his money into developing a clockwork draft horse who can walk on water. To be sure, projectors were willing to abscond with the investment funds gained from poor people star-struck with the possibility of riches, but the readiest and most easily accessible funds were those belonging to the wealthy, both merchants and dilettante nobles.

1660

Contemporary with the satires of deceitful patentees, Samuel Hartlib worked with others of like mind to establish institutions of knowledge and discovery using systematic investigation; these efforts would produce the Royal Society, chartered in London in 1660 by Charles II. Koji Yamamoto demonstrates the concern the Hartlib Circle had for the social stigma of projecting and sought to distance themselves from it.[65] Following Francis Bacon's intentions for a systematic investigation of the natural world, the Circle intended to effect broad legislative reforms of English education and depart from the then-current medieval curriculum.[66] Though they believed they were distinct from projectors because their investigations were in earnest, their movement united investigation into the natural world with legislative reform. Through seeking patents to protect their inventions from replication and passing legislative reform to enable the

[65] Yamamoto, K. (2012)
[66] John Milton*, Of Education

spread of the results of their investigation, projectors became less creatures of mechanical tinkering and more creatures of political authority.

1697

The language in Daniel Defoe's "An Essay Upon Projects" demonstrates why the Hartlib circle would have wanted to avoid the public appellation of projector:

> And yet your having a capacity to judge of these things no way brings you under the despicable title of a projector, any more than knowing the practices and subtleties of wicked men makes a man guilty of their crimes.[67]
>
> Projectors, they say, are generally to be taken with allowance of one-half at least; they always have their mouths full of millions, and talk big of their own proposals.[68]
>
> Others, being masters of more cunning than their neighbours, turn their thoughts to private methods of trick and cheat, a modern way of thieving every jot as criminal, and in some degree worse than the other, by which honest men are gulled with fair pretences to part from their money, and then left to take their course with the author, who skulks behind the curtain of a protection, or in the Mint or Friars, and bids defiance as well to honesty as the law.[69]

Deceit is part of the projector's stock in trade, and for this reason they are rightly condemned by society. But though deception characterizes the large part of projectors, there exists another kind:

> Others, yet urged by the same necessity [of survival], turn their thoughts to honest invention, founded upon the platform of ingenuity and integrity.[70]

[67] Defoe*, Essay Upon Projects
[68] Ibid
[69] Ibid
[70] Ibid

Defoe makes the allowance that a projector need not be a criminal. That some invention is honest and beneficial. And this invention need not be of the mechanical variety: banking, highway construction, insurance contracts, mutual aid organizations (called friendlies), sailors' widows' funds, pension offices, provision for the mentally handicapped, state lotteries in support of public hospitals, etc. etc. In each case Defoe makes an appeal that the government should take a hand in the construction of the institutions, explicitly so in one case:

> But the greatness of the work, and the modesty of the gentlemen concerned, prevailed with them to desist an enterprise which appeared too great for private hands to undertake. We want, indeed, a Richelieu to commence such a work. For I am persuaded were there such a genius in our kingdom to lead the way, there would not want capacities who could carry on the work to a glory equal to all that has gone before them.[71]

Defoe's Essay admits the deceptive tendencies of projectors, but argues that the honest inventions of projectors ought to be established by willing public officials who, implicitly, are capable of separating the genuine from the false.

Such faith in bureaucratic discernment was not universal, however. In describing the choice to become projectors, a contemporary contributor to the Gentlemen's Magazine describes theft and deception in government as less dangerous and more assured of success than highway robbery:

[71] Ibid

> I have heard, says Fog, of a couple extravagant fellows, who having spent their patrimony, consulted how to subsist for the future. One proposed the highway; but that was objected to as dangerous. They therefore concluded to pitch upon some trade where ignorance would not be easliy discovered; for it would be easier to set up for a statesman than a tailor.[72]

1723

Despite their efforts at avoiding the projector label, the Royal Society did not escape the wit of Jonathan Swift in his Gulliver's Travels third voyage to Lagado where he encounters Balnibarbi's Academy of Projectors.[73] Gulliver witnesses serious-minded scholars attempt to extract sunlight from cucumbers; to educate by having students eat wafers infused with mathematical propositions; and reconstitute food from human excrement. The absurdity of these investigations and the dependence upon court patronage aside, Swift introduces fashion and social ostracism to the projector. The system of agriculture formerly practiced in Lagado is maintained only by Gulliver's guide: Lord Manodi, a former governor whose estate is flourishing with produce. But despite the obvious success of his farming techniques, Manodi is ostracized by the Balnibari elite because he does not follow Academy-produced innovative agricultural techniques; en route to Lord Manodi's estate Gulliver passes the estates employing the fashionable new systems only to witness barren plots of land full of desperate tenants.

Swift's satire presents a two-margin model of payoffs to decision makers. Those who decide which agricultural technique to use will certainly be motivated by the expected

[72] "Of Imposters and Projectors" The Gentleman's Magazine, May 1733
[73] Swift*, Gulliver's Travels

quantity of produce: the more corn a farmer grows the more he'll be able to afford the necessaries and conveniences of life after bringing the corn to market. This constitutes the standard economic profit-maximizing actions of an individual employing rational expectations over technology; this model frames the decision maker as an individual concerned with maximizing his own utility subject to endowments, budget constraints, and transitive preferences. But it shares the weakness of all Robinson Crusoe-based individualistic economic modeling in that it ignores the sympathetic influences of other people Smith considered essential to understanding mankind, represented by the cost of social ostracism in Swift, and the cost of denouncement in China. Despite any productive shortcomings of the academy-produced farming techniques, it's not clear that a decision maker will maximize profitable production if the opportunity cost of non-conformity is high. The choices of projectors ought not to be viewed from a strict lens of technological improbability, but also as a plan to win the approbation and regard of their peers.

1737

Anthony Cooper, Earl of Shaftesbury, with whose work Smith was familiar[74], made an original addition to the domain of projectors. In Characteristicks of Men, Manners, Opinions, Times, Shaftesbury describes moral philosophers, those who seek to systematize humanity, as projectors.

> But here (my Friend!) you must not expect that I shou'd draw you up a formal *Scheme of the Passions, or pretend to shew you their Genealogy and Relation;

[74] TMS, VII,ii.48

> how they are interwoven with one another, or interfere with our Happiness and Interest. 'Twou'd be out of the Genius and Compass of such a Letter as this, to frame a just Plan or Model; by which you might, with an accurate View, observe what Proportion the friendly and natural Affections seem to bear in this Order of Architecture.
>
> Modern Projectors, I know, wou'd willingly rid their hands of these natural Materials; and wou'd fain build after a more uniform way. They wou'd new-frame the human Heart; and have a mighty fancy to reduce all its Motions, Balances and Weights, to that one Principle and Foundation of a cool and deliberate Selfishness.[75]

The link between Shaftesbury's projector and those preceding is obvious: all design schemes. But gone are the mechanical inventions, the patent-trolling and rent-seeking, the immediate connection to defraud financiers. What remains is the work of speculative thought. In this sense, social scientists, including Shaftesbury and Smith, gain the appellation of projector.

1755

Much of the rich meaning attendant upon projector was stripped out in 1755 with the publication of Samuel Johnson's Dictionary of the English Language.[76] All that remained were the antiseptic, "One who forms schemes or designs; one who forms wild impracticable schemes." Among the other words associated with projector (project, conceit, scheme, contrivance, plot), none share the connotation of wildness or improbability. The common link between the words is a systematic exercise of one's imagination. These definitions of projector remain constant through the 18th century and

[75] Anthony Cooper, Earl Shaftesbury*, Characteristicks of Men, Manners, Opinions, Times, vol. 1
[76] Johnson, Dictionary

well into the 19th. The modern usage of scheme echoes the 18th century's dual meaning of project and projector: the defensive scheme of an American Football team denotes the systematic arrangement of players to prevent the offense from advancing the football; a schemer is one who devises underhanded or illicit plans for his own gain. Nevertheless, Johnson does retain an important characteristic of the schemes of projectors: an increased risk of failure.

Interestingly, one of Smith's few published works besides TMS and WN was a critical review of the Dictionary. While commending the obvious effort and scholarship necessary for the work, Smith did not think Johnson had been systematic enough in marking the evolution of words' meanings. The irony of my claim that modern scholarship's reading of Smith's views on usury and projectors hinges on a similar failure to note a word's evolution is not lost upon your author.

1767

Adam Ferguson's "An Essay on the History of Civil Society" presents projectors as operating within a catallaxy, even in the market for constitutional and legislative reforms:

> Men, in general, are sufficiently disposed to occupy themselves in forming projects and schemes: But he who would scheme and project for others, will find an opponent in every person who is disposed to scheme for himself. Like the winds that come we know not whence, and blow whithersoever they list, the forms of society are derived from an obscure and distant origin; they arise, long before the date of philosophy, from the instincts, not from the speculations of men. The crowd of mankind, are directed in their establishments and measures, by

> the circumstances in which they are placed; and seldom are turned from their way, to follow the plan of any single projector.[77]
>
> Although free constitutions of government seldom or never take their rise from the scheme of any single projector, yet are they often preserved by the vigilance, activity, and zeal of single men.[78]

Ferguson applies the systemic approach of inventors to constitutions of government. Projectors, then, need not be frauds, entrepreneurs, rent-seekers, or otherwise: as Defoe suggested in his Essay upon Projects, legislative reform movements are equally the domain of a projector: a projector of administrative or regulatory systems.

1771

John Millar followed Smith, his teacher, in 1771 when he published The Origin of the Distinction of Ranks.[79] Here Millar makes an important distinction between the evolutionary legislative process of the past, and the way contemporary historians view that process.

> It is even extremely probable, that those patriotic statesmen, whose existence is well ascertained, and whose laws have been justly celebrated, were at great pains to accommodate their regulations to the situation of the people for whom they were intended; and that, instead of being actuated by a projecting spirit, or attempting, from visionary speculations of remote utility, to produce any violent reformation, they confined themselves to such moderate improvements as, by deviating little from the former usage, were in some measure supported by experience, and coincided with the prevailing opinions of the country. All the ancient systems of legislation that have been handed down to us with any degree

[77] Ferguson*, Essay on History of Civil Society, 1767, p. 89-90
[78] Ibid, p. 98
[79] The distinction of ranks appears in TMS, I.iii.2, and distinguishes the great from the common, and the ease with which the common sympathize and assist in furthering the interests of the great.

> of authenticity, show evident marks of their having been framed with such reasonable views; and in none of them is this more remarkable than in the regulations of the Spartan Lawgiver [Lycurgus], which appear, in every respect, agreeable to the primitive manners of that simple and barbarous people, for whose benefit they were promulgated.[80]

Contrast this with Millar's account of perfected political systems in his Historical View of the English Government:

> It seems to have been uniformly imagined by these authors, that the institutions above mentioned were peculiar to the government of the Anglo-Saxons; and that they were introduced by the singular policy of king Alfred, to whom the admiration of English writers has commonly ascribed every important regulation during the Saxon period.[81]
>
> There can be little doubt, that in the accounts transmitted by historians, the accuracy and regularity of the police, established by Alfred, has been greatly exaggerated; but even these exaggerations, the usual effects of wonder and admiration, may serve to convince us, that he made great improvements upon the former system.[82]
>
> Alfred, in a word, has become the English Lycurgus;4 and his interposition is the great engine which politicians have employed for explaining the origin of such particulars, in the English government, as have excited uncommon attention, and are too remote, in their beginnings, to fall within the limits of authentic history.[83]

Millar suggests that reform is achieved through small expedient steps of legislators tailored to suit the political preferences of the time, but when viewed in retrospect, particularly when viewed from a great distance, we have a tendency to see an underlying system. Our minds imagine what overall design the legislator could have conceived as he

[80] Millar*, Origin of the Distinction of Ranks
[81] Millar*, Historical View of the English Government, p. 80
[82] Ibid, p. 106
[83] Ibid, p. 107

implemented particular reforms. This view of admired statesmen of the past influences present political philosophy as we seek for a more refined system. Millar addresses such systems in his Historical View:

> The authority of every government is founded in opinion; and no system, be it ever so perfect in itself, can be expected to acquire stability, or to produce good order and submission, unless it coincides with the general voice of the community. He who frames a political constitution upon a model of ideal perfection, and attempts to introduce it into any country, without consulting the inclinations of the inhabitants, is a most pernicious projector, who, instead of being applauded as a Lycurgus, ought to be chained and confined as a madman.[84]

In all respects Millar conforms to Smithian opinions about men of system[85]: those who would impose systems without accounting for the desires and preferences of those who would operate within that system will, in Smith's words, make "the game go on miserably, and society must be at all times in the highest degree of disorder."[86] However, the man of system passage was added in the 6th edition in 1790 shortly before Smith's death, so perhaps that passage can be read as a tip of the hat to his former student.

The danger a legislative projector presents is in devising a scheme of governance ill-suited to the reality of human action.

1770-1790

[84] Ibid, p. 407
[85] See Weinstein 1983, p. 101-102
[86] TMS, VI.2.ii.17

Edmund Burke picks up on the themes in both Ferguson and Millar of legislators as projectors, though, characteristic of Burke's rhetoric, his descriptions tend to be less flattering.

> In former times the projectors of arbitrary Government attacked only the liberties of their country; a design surely mischievous enough to have satisfied a mind of the most unruly ambition. But a system unfavourable to freedom may be so formed, as considerably to exalt the grandeur of the State; and men may find in the pride and splendor of that prosperity some sort of consolation for the loss of their solid privileges.[87]

The deceit of the 17th century patent troll re-enters the field with Burke's account. The grandeur of the government is substituted for the liberty of the public, but the designs fall short.

Burke is similarly pessimistic about the likely results of the French revolution, led by political projectors:

> In France we have seen the wickedest and most foolish of men, the Constitution-mongers of 1789, pursuing this very course, and ending in this very event. These projectors of deception set on foot two modes of voluntary contribution to the state. The first, they called patriotick gifts. These, for the greater part were not more ridiculous in the mode, than contemptible in the project. The other, which they called the patriotick contribution, was expected to amount to a fourth of the fortunes of individuals, but at their own will and on their own estimate; but this contribution threatening to fall infinitely short of their hopes, they soon made it

[87] Burke*, Thoughts on the Cause of the Present Discontents, Selected Works v.1, 1999, p. 67

> compulsory, both in the rate and in the levy, beginning in fraud, and ending, as all the frauds of power end, in plain violence.[88]

Burke marries political projection with governing systems and reform movements, praising the modest, controlled progress of the British constitution, and damning the radical, wholesale reform movements of France.

1776/1791

The final entry developing the nature of projectors is an anecdote concerning three men, none of whom met Adam Smith: Alexander Hamilton, Thomas Jefferson, and Francis Bacon. Douglass Adair recounts a story of Hamilton and Jefferson discussing history's greatest men[89]: the portraits of Bacon, Locke, and Newton hung in Jefferson's apartments and confirmed his choice of history's greatest. Hamilton disagreed, believing Julius Caesar history's greatest man. Whom they appointed heir to the greatest acclaim of

[88] Burke*, A Third Letter to a Member of the Present Parliament, On the Proposals For Peace With the Regicide Directory of France By the Late Right Honourable Edmund Burke, Selected Works v.3, 1999, p. 150

[89] Adair, Fame and the Founding Fathers, 1974, pp. 13-21
This conversation took place after the adoption of the Constitution in the context of nationalizing revolutionary state debt during Washington's first term as President, convincing Jefferson and Madison to allow the federal government to pay the face value of war bonds to current holders (rather than the initial financiers of the war). See Dumas Malone, Jefferson and His Time, Vol. II: Jefferson and the Rights of Man (Boston, I951), 286. Significant is Julius Caesar's own relationship with debt: he canceled debts, permitted tenants to not pay rents for a year, and forbade the holding of more than 60,000 sesterces. (Caesar, Cicero, and Debt; check Fleming for exact cite) To the extent Hamilton's opinion of Caesar's greatness extended beyond military adventure into financial management, it is likely that opinion had more to do with the latter's willingness to leverage debt as a political tool rather than scrupulous regard to principles. Nor should we presume Hamilton's affirmation of Caesar's greatness to be pure admiration: the conditions leading to Shay's Rebellion – economic depression and pursuit of defaulted debtors – were similar those at the time of Caesar's elevation *dictator perpetuo*, and Hamilton's argument for the Constitution in Federalist 21 was an attempt to repair the evident weakness of the Articles to forcefully respond to a successful Caesar or Cromwell leading a similar rebellion.

mankind was a product of what actions they believed earned a man immortal fame. For Hamilton, the martial founding of a nation – an act he himself had recently accomplished – merited greatness. This conforms to Francis Bacon's essay "Of Honour and Reputation" which places founders, *conditores imperiorum,* highest among the deserving of fame. Jefferson's choice reflects Bacon's self-revision in his "Advancement of Learning", where Bacon "argued that the greatest glory should be awarded to those philosophers – we would call them 'scientists' – and inventors who had employed 'the Divine gift of Reason to the use and benefit of mankind.'"[90]

Adair suggests that these men would be called scientists, but Jefferson's inclusion of Locke suggests a different underlying unifying theme. That Bacon and Newton were scientists, or natural philosophers to use the 18th century term, is evident, but Locke was not. Rather, Locke's contribution was a systematic exposition of the principles of human society. Jefferson and the other American founding fathers relied heavily on his theory of a liberal social contract, one in opposition to the monarchial Hobbesian alternative. When you step back from the details of Bacon's and Newton's success in experimentation and gravity, you see a fuller picture of their endeavor: Bacon expounded upon a system of knowledge and the methods to grow it; we owe our modern scientific method to Bacon's system, and it is the general system, not the particular minutiae of experimental trial, that deserves our praise.

[90] Ibid, p. 16

For Newton, one need only refer to Smith's "History of Astronomy", which is a tale recounting the rise and fall of various systems of astronomy:

> And even we, while we have been endeavouring to represent all philosophical systems as mere inventions of the imagination, to connect together the otherwise disjointed and discordant phaenomena of nature, have insensibly been drawn in, to make use of language expressing the connecting principles of this one, as if they were the real chains which Nature makes use of to bind together her several operations. Can we wonder then, that it should have gained the general and complete approbation of mankind, and that it should now be considered, not as an attempt to connect in the imagination the phaenomena of the Heavens, but as the greatest discovery that ever was made by man, the discovery of an immense chain of the most important and sublime truths, all closely connected together, by one capital fact, of the reality of which we have daily experience.[91]

It is Newton's ability to engage our wonder and admiration in the simplicity of his system of Astronomy which vaults him over his competitors in our esteem. Smith does not pretend that Newton has discovered Truth: "[we] have insensibly been drawn in, to make use of language expressing the connecting principles of this on, **as if they were the real chains** which Nature makes use of to bind together her several operations." [**emphasis** added] Considering how familiar Smith was with systemic innovations in astronomy, it likely would not surprise him that Einstein's General Relativity improved upon Newton. Newton's Astronomy remains a system devised in the imagination; the grandeur of the system, one which encompasses the heavens and the earth, is what impresses us. And for this system Newton is accounted great, even by Jefferson.

[91] Smith, History of Astronomy, EPS, p. 105

Though the word is not used in these contexts, I suggest it is entirely appropriate to consider Bacon's hierarchy of fame to be topped by projectors. Those who not only benefit all humanity through all time by their discoveries, but allow further gains to be made with their devised systems of inquiry.

Incidentally, Smith considered reformers to sit on the top of the hierarchy of characters:

> The leader of the successful party, however, if he has authority enough to prevail upon his own friends to act with proper temper and moderation (which he frequently has not), may sometimes render to his country a service much more essential and important than the greatest victories and the most extensive conquests. He may re–establish and improve the constitution, and from the very doubtful and ambiguous character of the leader of a party, he may assume the greatest and noblest of all characters, that of the reformer and legislator of a great state; and, by the wisdom of his institutions, secure the internal tranquillity and happiness of his fellow–citizens for many succeeding generations.[92]

1785

One of the first editors of WN to provide commentary on Smith's work was William Playfair; his 1811 edition of WN included extensive footnotes, and when a long digression was required, Playfair embedded original chapters in the text. He began a 19th century trend of revising and "correcting" Smith's economic theory followed by, notably, Buchanan, McCulloch, and Wakefield.[93] On the subject of projectors he differs from successive editors by suggesting peculiar qualities:

[92] TMS VI.2.ii.14

[93] David Buchanan, WN, 1814, revised 1817, the fourth volume includes Buchanan's "Observations on the Subjects Treated in Dr. Smith's Inquiry into the Nature and Causes of the Wealth of Nations"; John Ramsay McCulloch, WN, 1828, revised 1863, the fourth volume includes "Supplemental Notes and Dissertations" regarding particulars of Smith's theory; Edward Gibbon Wakefield, WN, 1838, revised 1843, Wakefield's commentary is imbedded in supplementary notes directly following the chapters they address. Wakefield included Letter XIII of Bentham's Defense of Usury in the Note on Chapter IV Book II

> To treat all men who raise money by such [chains of] bills [of exchange] as projectors, is rather a harsh manner, though those who did so in Scotland at that time did in general deserve the name. They were new in the business, and unacquainted with the rules Mr. Smith has so properly laid down. They trusted to distant returns for fixed payments. They borrowed on fixed and not on circulating capital, and the borrowers and lenders both fell into the same error. No single operating on a great scale, can be sufficiently gainful to pay a long repetition of the expense of renewing and discounting bills; but if the operations of trade supported by such bills are frequent and lucrative, the discounts of the bills will be paid by the profits, and still leave a residue of gain. This is clearly proved by the mercantile transactions of this country, where those who have quick returns seldom suffer by such transactions, though those who attempt great projects, or to improve land, always do; for them the returns are always too slow to repay the expenses.[94]

Alone among other 19th century editors Playfair remarks upon a significant difference between those who raise money by discounting bills of exchange – I would call them financiers – and projectors; though, of course, both may chain bills of exchange. It is not the action of investment or finance then that constitutes a projector.

The look forward to 1811, 21 years after Smith's death, aids our reading of Playfair's first published work in 1785 "The Increase of Manufactures, Commerce, and Finance, with the Extension of Civil Liberty, Proposed in Regulations for the Interest of Money" which, like Bentham's Defense of Usury, argues against limits on interest on economic

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which directly references Smith's text and argues against Smith with his own words; Wakefield considered Bentham the last word on the subject: "I therefore reprint it entire, conceiving that it could not be placed in a fitter situation, than that which I have assigned to it, by the side of the erroneous opinions which it corrects." 1843, p. 412

[94] Playfair, WN, 1811, p. 222n

growth grounds. It's not clear that Smith ever read Playfair[95], but it suggests one last line of inquiry between Smith and projectors:

> A projector, who is not sanguine in his hopes, never can exist; if he were not, he would never be the thing that he is, unless he were a madman. Some of them, indeed, pretend not to be sanguine, but it is never true; they may indeed be obliged to go on sometimes after hopes of success have almost left them, but they must be expecting success when they first begin.[96]
>
> All projecting partakes of the nature of gaming, in a very considerable degree[97]; the risqué incurred is of the same nature, and the effect produced on the mind of those concerned is often the same. The circumstances under which, as well as the extent to which it may be prudent to adventure, may be reduced, in some measure, to calculation also. When projecting is compared to gaming, we must allude to that deep species of play which raises to the summit of fortune, or involves in misery and ruin; for such is the case with projecting in general.[98]
>
> There is not probably in the world a greater instance of the effects of appearances, and of the modes of doing a thing, than in the single one of gaming; which, when sanctified with the transfer book at the bank, with the business-aspect of the morning, and the spot where it is carried on, is not considered as discreditable, even to men who risque money that is not their own. It is however the deepest of all play, and if it were west of Temple-Bar, and carried on in the evening, would be reprobated as the most pernicious and disreputable of all things, by sober men of business. It is not even very discreditable to cheat at this play, so much is it disguised under the appearance of business.[99]

The characterization that Playfair sets forth is fairly simple: new business ventures are gambles and projectors are those gamblers who have optimistic estimates of their chances

[95] Adam Smith's Library (Mizuta, 2000) contains entries for Playfair's brothers James and John, and William was James Watt's personal assistant from 1777 to 1782 (Spence and Wainer, 1997), but stronger connection between Playfair and Smith is absent.
[96] Playfair, 1785, p. 108
[97] This statement greatly inspired the sympathetic credit market model found in Welfare Enhancing Usury Restrictions
[98] Ibid, p. 109
[99] Ibid, p. 89n

of success. The link between risk and failed projects was hinted at in Diderot's entry of Projettors, though Diderot lay the blame for failure on the projector's ineptitude. Here Playfair suggests that the rational calculation of projectors is systematically over-optimistic; or rather, considering his footnote in the Wealth of Nations, those who are systematically over-optimistic in their rational calculation are properly designated projectors.[100]

Describing projectors' operations as gaming supports including Smith's views on lotteries as an influence on his views of projecting, and we will pick up that thread in a following section.

2.6: Conclusion

In the preceding sections we have demonstrated the shortcomings of the post-Bentham understanding of projector, failing, as it does, to appreciate the justified concerns and criticisms attaining to that label for the span of nearly 2000 years. The projector was not

[100] Compare to Smith's comment on personal estimation:
"The over-weening conceit which the greater part of men have of their own abilities is an ancient evil remarked by the philosophers and moralists of all ages. Their absurd presumption in their own good fortune has been less taken notice of. It is, however, if possible, still more universal. There is no man living who, when in tolerable health and spirits, has not some share of it. The chance of gain is by every man more or less overvalued, and the chance of loss is by most men undervalued, and by scarce any man, who is in tolerable health and spirits, valued more than it is worth." (WN I.10.i.26)
If we took Smith's claim that all men were optimistic regarding their prospects and Playfair's definition of projectors as those systematically optimistic, we would come to the conclusion that nearly all men are projectors. Possibly that's what Smith had in mind, since that isn't too far from Smith's subsequent observation on the popularity of lotteries. (WN I.10.i.27) But not only would common prudence imposed by bearing the costs of optimism temper most people (TMS I.3.iii.4-5), but the diversification of capital assets in commerce tend to self-insure at a reasonable rate. (WN I.10.i.28)

merely an innovator, though they did indeed seek to transform the world around them. The projector practiced not merely a particular profession, but possessed serious moral and character failings; he was deceitful and debasing of others and himself; he was inexact and non-methodical. The projector did not want to make small changes to demonstrate the validity of his claims, but desired to first make grand and sweeping changes based on unproven principles. The projector did not merely craft an argument from available evidence but begged the question and arranged his arguments to arrive at a predestined conclusion. The projector did not address a knowledgeable audience but sought out those whose ignorance could easily be exploited by either the projector's naive enthusiasm or his mendacity.

It is certainly true, as Bentham argues in his Defense of Usury[101], that financial projectors would blend in with those who sought financing for legitimate reasons in the same way illegitimate alchemists attempted to associate themselves with legitimate alchemists. Adam Smith may well have agreed. A close examination of the way Bentham and Smith employed "projector" in their works will be taken up in the next chapter.

[101] Bentham*, DU, Letter XIII

3. Projectors as Chimerical Men of System: The Usury Debate between Adam Smith and Jeremy Bentham

Jeremy Bentham accused Adam Smith of inconsistency in his Defense of Usury, characterizing "projectors" as beneficial entrepreneurs who should not be prohibited from borrowing at high rates of interest on the grounds that even their failures would lead to economic growth. A close look at Adam Smith's work finds that Bentham misunderstands Smith's argument; that narrowly defining projectors as entrepreneurs is inappropriately applied to the market institutions of the time; and that Smith develops and consistently applies a theory of market agency through his work that defends his advocacy of price ceilings in financial markets even as he rejects its application elsewhere.

3.1 Introduction

Adam Smith clearly advocates for a legal price ceiling in the Wealth of Nations, a work otherwise dedicated to extolling the virtues of restraining government's tendency to interfere in markets. Commentary on Smith's usury passages since his death have run the gamut from baffled to technical macroeconomic justifications. And though all of them dutifully cite Smith, they miss a critical character in his reasoning: the projector. The etymology of this word proves to have an impact on our reading[102], and if it doesn't recommend our re-adoption of usury restrictions in modern society, it at least reveals the economic problem Smith believed usury laws solved.

Modern scholars often preface Smith's advocacy of usury laws with a clause expressing incredulity: Rockoff's working paper began with: "Broadly speaking we can distinguish two strands of support for usury laws: moral arguments that can be traced to the Bible and to the ancient Greek philosophers, and economic arguments that can be traced to the

[102] Discussed in Middleton, "The Transformation and Deception of Projectors"; if anything is clear from a review of 2000 years of commentary on the virtue or vice of projectors, it's that what is signified by "projector" isn't clear. Perhaps this might explain why the term lost popularity in the mid-19th century to be replaced by words with greater specificity. When we read Smith's opinion on the prudence of enforcing usury laws and employing "projector" to that effect, we should keep in mind that the word has been saddled with meaning: Sturteveant's mechanic; Brugis' patent-troll; Wilson's fraud; Hartlib's scientific investigator; Defoe's social engineer; Swift's fashion-trend setter; Shaftesbury's social scientist; Johnson's wild schemer; Diderot's inept grand designer; Furgeson and Millar's legislative reformer; Burke's manipulative statesman; Jefferson's methodologist; Playfair's gambler; and Bentham's entrepreneur. Bentham abjured investigating precisely what Smith meant, which is the purpose of the present work.

mercantilists and (of all people) to Adam Smith."[103] These authors then proceed to reverse-engineer Smith's reasoning to explain why he would support the legal price restraints on a central industry in the market economy. Amartya Sen uses the advocacy to question Smith's commitment to markets.[104] Stiglitz and Weiss look at the credit rationing aspects of price ceilings.[105] Levy sees macroprudential encouragement of particular sectors for economic growth reasons.[106] Hollander sees mitigation of risk-preferences among lenders.[107] Paganelli, departing from the trend of seeking a technical explanation for Smith's views, believes that usury law advocacy was the product of moral philosophic constraints on public policy.[108] Stigler explains Smith's advocacy as unsystematic: it was instead a lapse of reason.[109]

The unifying characteristic of these commentaries on Smith is that they take for granted Jeremy Bentham's definition of projector qua entrepreneur: an individual who risks his own – either his own capital, or his promises for future capital – to combine existing

[103] Rockoff "Prodigals and Projectors: An Economic History of Usury Laws in the United States from Colonial Times to 1900" 2003
[104] Sen, "Development as Freedom", 1999
[105] Stiglitz and Weiss, "Credit rationing in markets with imperfect information" 1981
[106] Levy, "Adam Smtih's Case for Usury Laws" 1987
[107] Hollander, "Jeremy Bentham and Adam Smith on the Usury Laws" 1999
[108] Paganelli, "In Medio Stat Virtus" 2003. Her interpretation is suspect: Smith does not consistently apply a median rule in his advocacy for all rules; the elimination of the Corn Laws is one example of what Paganelli might consider an extreme. Also, if policy exists on a continuous spectrum for any policy there is always going to be a more extreme version of that policy: every policy can be viewed as the median policy, given that you have the freedom to define the corner solutions.
[109] Stigler, "Memoirs of an Unregulated Economist" 1988; in his interpretation Stigler follows 19th century editorial commentary on the Wealth of Nations: both McCulloch's (1828) and Wakefield's (1843) editions of WN include footnotes expressing befuddlement. These instances will be treated of below.

resources into a new combination through innovation, imitation, or arbitrage.[110] Indeed it is Bentham's definition qua entrepreneur that renders Smith internally inconsistent, which he uses to great effect in his Defense of Usury, even as he admits in the same passage that Smith may be capturing more than mere entrepreneurs:

> As to these, what your definition is of projectors, and what descriptions of persons you meant to include under the censure conveyed by that name, might be material for the purpose of judging of the propriety of that censure, but makes no difference in judging of the propriety of the law, which that censure is employed to justify.

This paper takes seriously the possibility that Smith was targeting a specific group of people operating in the Scotland of his time when he advocated limits on usury, and that while these projectors share with entrepreneurs the qualities of individuals engaged in investment, they remain distinct.

The first section addresses Bentham's specific criticisms of Smith; the second section will examine Adam Smith's use of projector in his corpus, including supplementary digressions on "chimera" and "undertaker", to develop an understanding of Smith's meaning; the third section will apply that understanding to how Smith characterizes market institutions, and regulations' influences on agents, to see if Smith remains internally consistent.

3.2: Bentham's Criticism of Smith

[110] Bentham, "Defense of Usury" 1787, XIII.7.

Smith scholarship considers Bentham's Defense of Usury the definitive rebuttal to Smith's advocacy for usury laws on the grounds of disabling projectors: EG Wakefield even included the Defense's Letter 13 in an extended note to Wealth of Nations, Book II, Chapter IV: Of Stock Lent at Interest.[111]

Bentham rather helpfully defined what he meant by projectors: "I mean projectors: under which invidious name I understand you to comprehend, in particular, all such persons as, in the pursuit of wealth, strike out into any new channel, and more especially into any channel of invention."[112] Here Bentham returns to the early 17th century understanding of projector, taking up Sturteveant's claims in "Metallica" in opposition to, as it were, Smith's Brugis; Bentham seems content to dismiss 150 years of linguistic evolution.[113]

Under no circumstances should we think of Bentham's headstrong definition of projector as extraordinary: he was a prolific word-smith. Among the 1000 most frequently cited sources in the Oxford English Dictionary, Bentham is the 188th most commonly quoted in OED; 120th most commonly quoted individual; 75th most common individual original source; 84th most common individual originator for a sense.[114]

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[111] Smith, WN, ed: EG Wakefield (1835), p 411

[112] Bentham, DU, XIII.3

[113] It is entirely reasonable that Bentham would have employed the modern term entrepreneur if it had gained common usage by his time. It was not until 1855 that entrepreneur began to be used much in English at all, and not until 1880 that its use began its current trajectory and use to describe an individual who employs capital to seek a profit opportunity. See Google Ngram "Entrepreneur+entrepreneur" between 1700-2015.

[114] OED.com, Top 1000 Sources

Happily, Bentham is careful not to impose his definition on Smith; rather he is content to point out that his projector a subset of Smith's projector:

> As to these, what your definition is of projectors, and what descriptions of persons you meant to include under the censure conveyed by that name, might be material for the purpose of judging of the propriety of that censure, but makes no difference in judging of the propriety of the law, which that censure is employed to justify. Whether you yourself, were the several classes of persons made to pass before you in review, would be disposed to pick out this or that class, or this and that individual, in order to exempt them from such censure, is what for that purpose we have no need to enquire. The law, it is certain, makes no such distinctions: it falls with equal weight, and with all its weight, upon all /those persons, without distinction to whom the term projectors, in the most unpartial and extensive signification of which it is capable, can be applied.[115]

With these few lines Bentham predicts and precludes the line of investigation this paper has taken, at least as far as judging the merits of usury laws is concerned. Because honest invention and innovation is squashed by those borrowers who would otherwise be willing to pay rates of interest higher than the legal maximum, and because the higher standard of living attained at their time (and by extension, the standard of living we enjoy today) was due to innovative projects, usury laws produce a net-drag on the progress of society.

[115]Bentham, DU, XIII.7

When addressing the possibility that innovation will fail and destroy a nation's capital rather than enhance it, Bentham is able to quote Smith's own argument against him. In the Defence Bentham cites:

> With regard to misconduct, the number of prudent and successful undertakings is everywhere much greater than that of injudicious and unsuccessful ones. After all our complaints of the frequency of bankruptcies, the unhappy men who fall into this misfortune make but a very small part of the whole number engaged in trade, and all other sorts of business; not much more perhaps that one in a thousand. Bankruptcy is perhaps the greatest and most humiliating calamity which can befall an innocent man. The greater part of men, therefore, are sufficiently careful to avoid it. Some, indeed, do not avoid it; as some do not avoid the gallows.[116]

Bentham asks if bankruptcy is such an incentive against imprudence, why wouldn't the risk of losses counterbalance the goad to imprudence of a desire to gain? With bankers sufficiently averse to losses you shouldn't have a need for prudence enforced through legislation.

Bentham also invokes concentrated private costs metaphorically when he references Curtius in the Defense:

> The career of art, the great road which receives the footsteps of projectors, may be considered as a vast, and perhaps unbounded, plain, bestrewed with gulphs, such as Curtius was swallowed up in. Each requires an human victim to fall into it ere it can close, but when it once closes, it closes to open no more, and so much of the path is safe to those who follow.[117]

[116] Smith, WN II.iii.29
[117] Bentham, DU XIII.30

Fig. 2.1: Paolo Veronese, The Sacrifical Death of Marcus Curtius

Bentham's reference means that an innovator risks his own capital, reputation, property, etc, on the chance for success.[118] If he succeeds, the gains are his; if he fails, he himself is the one who feels the loss most keenly. In addition to being the one swallowed by the chasm, the entrepreneur teaches others how things may not be done. Thomas Edison

[118] An earthquake opened a chasm within the Roman forum; an oracle claimed that only Rome's most precious possession would close it. Marcus Curtius sacrificed himself, Rome's most precious possession of valor, and the chasm closed. Inset: The Sacrificial Death of Marcus Curtius (1550–52) by Paolo Veronese.

would agree: “I have not failed 1000 times. I have successfully discovered 1,000 ways not to make a lightbulb.”[119]

At the same time as it dismisses contextual interpretations of who Smith may have meant by “projectors”, Bentham also covers his own tracks: for it to hold any weight, Bentham’s argument must be from the contrapositive – that 18th century society would have been even more developed had there been no limits to interest – because all innovation to that point had been conducted under the imposition of usury laws. But at this point the relative proportions of honest to dishonest projectors matter: if usury laws had indeed driven more prodigals and dishonest projectors out of the market for loanable funds than it drove out honest innovators, then it’s not clear that the net product of usury laws is negative. And what’s more, by admitting ignorance of who Smith references when he says “projectors”, he doesn’t merely find evidence to the contrary wanting – he claims that no evidence whatsoever that dishonest projectors could be a greater burden than entrepreneurs could benefit. This signals Bentham’s departure from empirical observation and reliance on pure theory to argue his point; something Smith, with his voluminous evidentiary support was loath to do.

3.3 Smith’s use of “Projector” in his Corpus

[119] Middleton, Great Quotations that Shaped the Western World, 2008

Having gained a wide view of the potential meanings of projector in Smith's works,[120] an investigation into what he claims will be the bad consequences of projecting will help narrow the range of possibilities. But first, it warrants returning to the first chapter of WN when Smith discusses productivity increases from the division of labor for evidence of what he likely does not mean by projector:

> Thirdly, and lastly, every body must be sensible how much labor is facilitated and abridged by the application of proper machinery. It is unnecessary to give any example. I shall observe, therefore, that the invention of all those machines by which labor is so much facilitated and abridged, seems to have been originally owing to the division of labor. Men are much more likely to discover easier and readier methods of attaining any object, when the whole attention of their minds is directed towards that single object, than when it is dissipated among a great variety of things.[121]

The division of labor is the lynchpin of Smithian economic growth. The confusion of 200 years of scholarship at why Smith, a very careful thinker and painstaking writer, would cast such strong aspersions on projectors would be entirely justified if those projectors were the discoverers of labor-abridging machines, whose actions were caused by the division of labor,[122] the result of which enabled greater productivity and the increase and accessibility of the necessaries and conveniences of life. So too would Smith's warm

[120] Middleton, "Projectors in their 18th Century Context"
[121] Smith, WN I.i.8
[122] So enamored was Smith of the division of labor that he fell into a pit of rendered animal fat and lime touring the Glasgow Tan-Work with Charles Townshend while he elaborated on the subject. (Ross, Life of Adam Smith, 2010) Depictions of Smith in contemporary magazines suggest his cocoon of speculation was well known. (Phillipson, Adam Smith: An Enlightened Life 2012, Illustration 28)

relationship with, and sponsorship of, James Watt at Glasgow[123] strike the reader as odd. This paper takes as given that Smith by no means references the inventor of machines when he condemns projectors. Sturteveant's tinkerer, so far as he invents or improves upon an existing design, is safe.

Projectors are mentioned 22 times in the Wealth of Nations, and once in a now-lost unpublished manuscript quoted by Dugald Stewart in his Account of the Life and Writings of Adam Smith, L.L.D. included in Essays in Philosophical Subjects.[124] The instances in WN may be grouped into 5 broad movements: two mentions in 1.x.42-43 where projectors establish a new manufacture or commerce; fifteen mentions in 2.ii.57-77 where the credit bubble of 1772 is attributed to bills of exchange; two mentions in 2.iv.15 regarding usury and the threat they pose to credit markets; one mention in 2.v.37 regarding improvements in agriculture; two mentions in Book 5, once in Chapter 1, once in Chapter 3, both concerning burdens on public funds. Each instance will be treated in order.

The first two appearances of projector in WN appear in a passage concerning the relative rates of return on wages, rent, and profit across various industries, and might fairly be

[123] Phillipson, An Enlightened Life (2012)
[124] This tally is limited to a search for "projector" and "projectors" in Smith's corpus; "project" appears a great deal more often applied to a wider variety of circumstances. Further investigation into those instances would supplement the analysis presented here, and may be attempted in the future.

interpreted as an expression of an efficient market in general equilibrium. Smith's result of equalizing the wages of labor requires three conditions: that the industry be known and established; that the employments be in their natural state; and that the labor represents full-time employment for the laborer. The first condition suggests that employers and employees have discovered an optimal production process, have great familiarity with the risks involved, the industry is characterized by little uncertainty, and the customer base's demand for the product is relatively dependable. The second condition of an ordinary or natural state of employments recalls earlier reasoning about the origin of money,[125] and the relationship between the actual market price, the natural price, and the causes of gaps between the two. I suggest a modern interpretation would either be P=MC or P=AC. The third imposed condition recognizes the different natures of full-time and part-time employment, and consequently their differing compensations.

New manufactures and new avenues of commerce constitute a violation of the first condition requiring establishment, and thus result in higher wages paid to employees of industry with uncertain prospects. It is in this passage which projectors seem most like entrepreneurs and conform to Bentham's characterization.

> When a projector attempts to establish a new manufacture, he must at first entice his workmen from other employments by higher wages than they can either earn in their own trades, or than the nature of his work would otherwise require, and a considerable time must pass away before he can venture to reduce them to the common level. Manufactures for which the demand rises altogether from fashion and fancy, are continually changing, and seldom last long enough to be

[125] Smith, WN 1.iv.17

> considered as old established manufactures. Those, on the contrary, for which the demand arises chiefly from use or necessity, are less liable to change, and the same form or fabric may continue in demand for whole centuries together. … The establishment of any new manufacture, of any branch of commerce, of any new practice in agriculture, is always speculation, from which the projector promises himself extraordinary profits.[126]

This passage establishes several important links: that new manufacturers are always speculative; that both fashion and use can generate the demand satisfied by new manufactures; that projectors estimate unsatisfied demand to generate more-than-ordinary profits. One reading suggests the link that new speculative manufactures are necessarily the product of projectors; such a reading would support Bentham's criticism and suggest that Smith advocated against new manufactures, commerce, and agricultural practices, and any evidence in WN that suggested otherwise produces the internal conflict that baffled 19th century commentators. The relevant question becomes: is there evidence that individuals besides projectors establish new manufactures?

Smith does not lay the credit for all improvements in machinery at the feet of those workmen most familiar with the trade.

> Many improvments have been made by the ingenuity of the makers of the machines… and some by that of those who are called philosophers or men of speculation, whose trade it is, not to do any thing, but to observe every thing; and who, upon that account are often capable of combining together the powers of the most distant and dissimilar objects. In the progress of society, philosophy or speculation becomes, like every other employment, the principal or sole trade and

[126] Smith, WN 1.x.b.42-43

> occupation of a particular class of citizens. Like every other employment too, it is subdivided into a great number of different branches, each of which affords occupation to a particular tribe or class of philosophers.[127]

Smith linked speculation and projection in the creation of new manufactures; but he linked speculation and philosophy first. If the first connection is a necessary one, and the second too, as it seems, doesn't this mean then that projectors and philosophers are identical? Or perhaps the links are not necessary but conditional: both philosophers and projectors engage in speculation, and perhaps both open new manufactures, but the natures of the two classes of men of speculation differ in some critical way.

Keeping that question in mind we continue to the second, and by far largest, concentration of projectors in Smith's corpus included in the discussion of the credit crisis of 1772. Here Smith explains how projectors access credit markets by discounting bills of exchange:

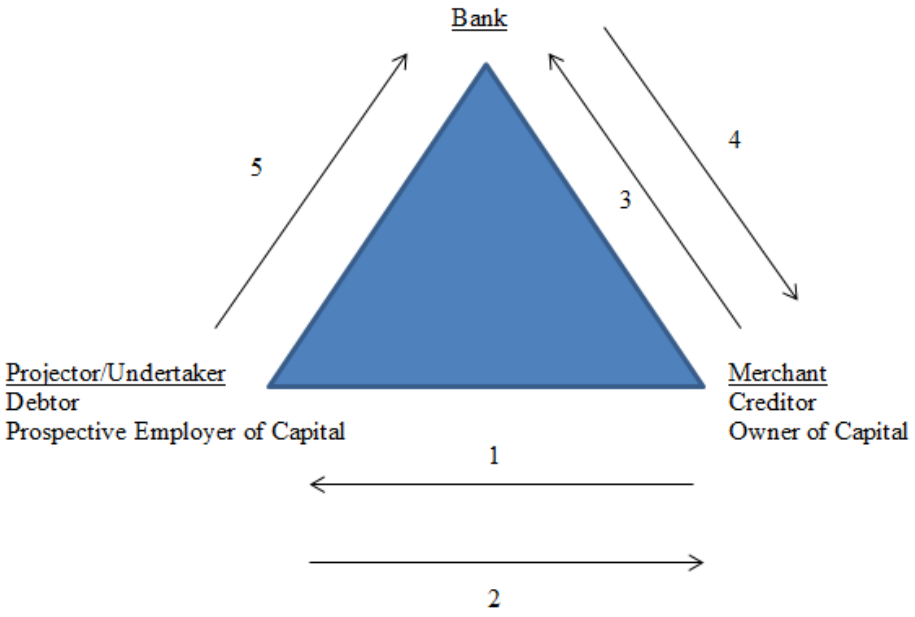
> When a bank discounts to a merchant a real bill of exchange drawn by a real creditor upon a real debtor, and which, as soon as it becomes due, is really paid by that debtor; it [the bank] only advances to him [the merchant] a part of the value which he [the merchant] would otherwise be obliged to keep by him unemployed, and in ready money for answering occasional demands.[128]

[127] Smith, WN I.i.9
[128] Smith, WN II.ii.59

> Traders and undertakers [the debtor] may, no doubt, with great propriety, carry on a very considerable part of their projects with borrowed money. In justice to their creditors [the merchant], however, their [the debtor] own capital ought, in this case, be sufficient to ensure, if I may say so, the capital of those creditors [the merchant]; or to render it extremely improbable that those creditors should incur any loss, even though the success of the project should fall very much short of the expectation of the projectors [the debtor].[129]

After specifying a few pronouns, the three-way relationship between banks, merchants, and projectors becomes clear:

[129] Smith, WN II.ii.64



1: The merchant loans capital to the undertaker and draws up a promissory bill of exchange.
2: The undertaker signs the bill of exchange promising payment for the capital in a specified period of time, usually 90 days.
3: The merchant sells the claim to payment to the bank discounted at interest, limited by the legal rate.
4: The bank discounts the bill according to its present value, extending to the merchant either metal coin or paper banknotes.
5: The projector pays the holder of the bill of exchange the promised sum at the end of the term, or defaults.

Fig. 2.2: 18th C. Bill of Exchange Transactions

The diagram does not mean to suggest that merchants do not employ capital – Smith confirms that they do – but rather that employing the capital belonging to someone else in a new manufacture through debt is something both projectors and undertakers do. In either case, the link between entrepreneurial action and projecting established in chapter 10 grows stronger here.

Nor does the diagram fully comprehend the credit market in Scotland in the 18th century. The note-issuing banks that discount bills of exchange Smith mentions were often smaller private banks, who would then re-discount the bill with one of the two chartered banks, the Bank of Scotland and the Royal Bank of Scotland. Both chartered banks accepted accredited private notes at par, and redeemed them for coin upon request. Those notes would then be returned to the issuing bank in exchange for coin, and the entire exchange would be complete.[130] Including chartered banks into bill discounting places the burden of potential credit crises on the public credit, which will be instrumental in the fallout of Douglas, Heron, & Company, to be discussed below.

But the link between projectors and entrepreneurial action is not complete. Further on Smith distinguishes between "real debtors" and projectors.

> When two people, who are continually drawing and re-drawing upon one another, discount their bills always with the same banker, he [the banker] must immediately discover what they are about, and see clearly that they are trading, not with any capital of their own, but with the capital which he advances to them. But this discovery is not altogether so easy when they discount their bills sometimes with one banker, and sometimes with another, and when the same two persons do not constantly draw and re-draw upon one another, but occasionally run the round of a great circle of projectors, who find it in their interest to assist one another in this method of raising money, and to render it, upon that account, as difficult as possible to distinguish between a real and a fictitious bill of exchange; between a bill drawn by a real creditor upon a real debtor, and a bill for which there was properly no real creditor but the bank which discounted it; nor any real debtor but the projector who made use of the money. When a banker had even made this discovery, he might sometimes make it too late, and might find that he had already discounted the bills of those projectors to so great an extent,

[130] White, Theory of Monetary Institutions (1999)

> that, by refusing to discount any more, he would necessarily make them all bankrupts, and thus, by ruining them, might perhaps ruin himself.[131]

This process of borrowing on the security of borrowed capital repeated itself leading to the collapse of the subprime mortgage market in 2008.[132] In both 1772 and 2008 the problem was an overleveraged market with insufficient debtor's equity to preserve creditor solvency in the face of a negative price shock. Says Smith, when the bankers became aware of the problem, their self-preservation suborned their interests, formerly aligned with depositors, and they became complicit in over-leveraging bills of exchange.[133]

Here is the first tangible characteristic of projectors qua entrepreneurs: they lack even sufficient equity to secure their creditor. Or, as Smith might have said, their equity bears no proportion to the magnitude of their design.

> The debtors of such a bank, at that whose conduct I have been giving some account of, were likely, the greater part of them, to be chimerical projectors, the drawers and re-drawers of circulating bills of exchange, who would employ the money in extravagant undertakings, which, with all the assistance that could be given them, they would probably never be able to compleat, and which, if they should be completed, would never repay the expence which they had really cost, would never afford a fund capable of maintaining a quantity of labor equal to that which had been employed about them. The sober and frugal debtors of private persons, on the contrary, would be more likely to employ the money borrowed in sober undertakings which were proportioned to their capitals, and which, though

[131] Smith, WN II.ii.72
[132] Rockoff, Upon Daedalian Wings of Paper Money, 2009
[133] See Saville's History of the Bank of Scotland, Douglas Heron chapter, for account of retrenchment

> they might have less of the grand and marvelous, would have more of the solid and the profitable…[134]

It should not surprise us that proportion is a weighty matter for Smith, being the student of Plato that he was. The financial element of disproportion is between a projector's current assets and those assets he expects to require.

The third appearance of projectors in WN is in the passages on usury laws in Book 2, Chapter 4, paragraph 15; they are in close enough approximation they may be quoted in toto.

> The legal rate, it is to be observed, though it ought to be somewhat above, ought not to be much above, the lowest market rate. If the legal rate of interest in Great Britain, for example, was fixed so high as eight or ten per cent. the greater part of the money which was to be lent, would be lent to prodigals and projectors, who alone would be willing to give this high interest. Sober people, who will give for the use of money no more than a part of what they are likely to make by the use of it, would not venture into the competition. A great part of the capital of the country would thus be kept out of the hands which were most likely to make a profitable and advantageous use of it, and thrown into those which were most likely to waste and destroy it. Where the legal interest, on the contrary, is fixed but a very little above the lowest market rate, sober people are universally preferred as borrowers, to prodigals and projectors.[135]

[134] Smith, WN II.ii.77
[135] Smith, WN II.iv.15

Smith's use here isn't specific to what prodigals and projectors do, but rather describes their willingness to pay relative to the rest of the market participants: for their own reasons, projectors, like prodigals, are willing to pay a higher price.

The fourth instance of projectors in WN appears shortly after the usury passages, but suggests an entirely different meaning from debtor.

> The profits of agriculture, however, seem to have no superiority over those of other employments in any part of Europe. Projectors, indeed, in every corner of it, have within these few years amused the public with most magnificent accounts of the profits to be made by the cultivation and improvement in land.[136]

While possible that the projectors Smith refers to are potential debtors seeking to invest in agricultural improvements, it seems equally likely Smith refers to theories of wealth and economic growth which place the greatest emphasis on land, infrastructure investment, and agricultural production. John Law's scheme to guarantee the value of paper money with developed land, a scheme declined in Scotland but accepted in France by the Duke of Orleans in 1716, resulted in the infamous Mississippi Bubble collapse in 1720. The promised returns on development in Louisiana never materialized; the over-issued notes inflated prices; the run on the Banque Royale ruined depositors' accounts and debtors' credit.[137]

[136] Smith, WN II.v.37
[137] Mackay, Extraordinary Popular Delusions and the Maddness of the Crowds (1841)

Smith commits Books III and IV to demonstrating why extraordinary profits should not be had by agricultural development.[138] Those books are titled "Of the different Progress of Opulence in different Nations", Book III; and "Of Systems of political Oeconomy", Book IV. A systematic response such as this suggests that the projectors' magnificent accounts were similarly systematic works of commerce in Shaftesbury's social scientist interpretation of projector, instead of wild claims made by Johnson's optimistic schemer.

The final instance of projector in WN concerns public works and raising revenue. After describing an argument of how toll roads might be better administered by bureaucrats than by trustees and raise surplus revenue for the government, Smith comments that, "though a considerable revenue might be gained in this manner, I have no doubt, though probably not near so much, as the projectors of this plan have supposed."[139] He found evidence to confirm his suspicion of the sanguinity of the government projectors.[140] Here, as in Burke, Millar, and Ferguson, projectors are connected to guiding government projects. It seems likely that when the project fails to raise its own expense, the loss is covered through debt. Such is the account Smith gives in WN, Book V, Chapter III.

[138] "What circumstances in the policy of Europe have given the trades which are carried on in towns so great an advantage over that which is carried on in the country, that private persons frequently find it more for their advantage to employ their capitals in the most distant carrying trades of Asia and America, than in the improvement and cultivation of the most fertile fields in their own neighborhood, I shall endeavor to explain at full length in the two following books." WN II.v.37

[139] Smith, WN V.i.d.11

[140] Editions 3-6 include a footnote: "I have got good reasons to believe that all the turnpike tolls levied in Great Britain do not produce a neat revenue… sufficient to keep in repair fife of the principal roads in the kingdom."

Projectors appear for a final time in WN in V.iii.67, again in relation to the public debt, but this time a spectator:

> The most sanguine projector, however, could scarce flatter himself that any augmentation of this kind [a land tax] would be such as could give any reasonable hopes, either of liberating the publick revenue altogether, or even making such progress towards that liberation in time of peace, as either to prevent or to compensate the further accumulation of the publick debt in the next war.[141]

This passage follows an explanation of how pre-commercial governments were obliged to prudently maintain a treasure hoard in times of peace to defray additional expenses in times of war; how merchants and wealthy private citizens, by their willingness to extend governments credit, enabled the expenses of peacetime government to rise to the level of peacetime revenue, spent on the various luxuries commerce provides; how wartime debt, once incurred, is hardly ever relieved by parsimony, but either by default or, more insidiously, by debasement. By invoking the judgment of the "most sanguine projector", Smith places responsible payment of government debt beyond the capacity of improved revenue systems. Not even the wild, bold, adventurous, over-optimistic, golden-dreamed imaginations of projectors are able to service government debt with tax revenue.

Though neither of these projectors who estimate toll road revenue generation or balance government spending budgets with improved taxation schemes serve to make the whole race of projectors a creature of government authority – and even if they did, limits on

[141] Smith, WN V.iii.67

interest rates would hardly touch their designs – the connection between projectors and public debt is worth keeping in mind.

The only instance of projector appearing in Smith's corpus is in Dugald Stewart's Account of the Life and Writings of Adam Smith, LLD; there Stewart quotes from a manuscript in his possession Smith had written and presented in 1755 which, if its reasoning stays constant through Smith's writing, destroys idea that projectors are merely the most optimistic subset of entrepreneurs:

> Man is generally considered by statesmen and projectors as the materials of a sort of political mechanics. Projectors disturb nature in the course of her operations in human affairs; and it requires no more than to let her alone, and give her fair play in the pursuit of her ends, that she may establish her own designs. … Little else is requisite to carry a state to the highest degree of opulence from the lowest barbarism, but peace, easy taxes, and a tolerable administration of justice; all the rest being brought about by the natural course of things. All governments which thwart this natural course, which force things into another channel, or which endeavor to arrest the progress of society at a particular point, are unnatural, and to support themselves are obliged to be oppressive and tyrannical.[142]

This passage is laden with significance for projectors' role in Smith's works. Projectors do not exist within the natural course of human affairs – a nature distinguished from that of all other animals for our propensity to exchange – but instead impose upon human affairs their own ends and designs. Commerce may be a means projectors use to impose

[142] Smith, EPS IV.26

ends and designs, but commerce cannot characterize their true nature, else their investments would be as natural as any other debtor's.

There is also the parallel language between projectors and governments: "projectors disturb nature in the course", and "governments thwart this natural course". This language is repeated in his discussion of bounties: "

> Bounties upon the exportation of any home-made commodity are liable, first, to that general objection which may be made to all the different expedients of the mercantile system; the objection of forcing some part of the industry of the country into a channel less advantageous than that in which it would run of its own accord.[143]

Though Smith made allowances for privately-run bounty systems,[144] he clearly has in mind publicly-funded bounty systems, as most of the chapter deals with them. The symmetry of language of governments, bounties, and projectors forcing commerce into unnatural channels suggests they may be agents external to markets, but that even if projectors are market agents, they are a peculiar type of agent.

Projectors having their own ends may not be significant, but the implication of imposing designs through political mechanics recalls a passage added to the final edition of TMS, after he'd read Bentham's Defense:

[143] Smith, WN IV.v.a.24
[144] Smith, WN IV.v.a.26

> Amidst the turbulence and disorder of faction, a certain spirit of system is apt to mix itself with that public spirit which is founded upon the love of humanity… The man whose public spirit is prompted altogether by humanity and benevolence, will respect the established powers and privileges even of individuals, and still more those of the great orders and societies, into which the state is divided… The man of system, on the contrary, is apt to be very wise in his own conceit; and is often so **enamoured with the supposed beauty of his own ideal plan of government**, that he cannot suffer the smallest deviation from any part of it. He goes on to establish it completely in all its parts without any regard either to the great interests, or to the strong prejudices which may oppose it. He seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon the chess board. **He does not consider that the pieces upon the chess board have no other principle of motion besides that which the hand impresses upon them**; but that, in the great chess-board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might chuse to impress upon it. If those two principles coincide and act in the same direction, the game of human society will go on easily and harmoniously, and is very likely to be happy and successful. If they are opposite or different, the game will go on miserably, and the society must be at all times in the highest degree of disorder.[145] [**Emphasis added**]

Smith explicitly mentions princes and legislators in this passage, so it only directly recalls the government's tendency to divert the course of nature, and touches projectors only indirectly. Nevertheless, the language of imposition remains: men of system impose their own imagined order upon society, and directs it to move as he determines is best. Is this not "disturbing nature in its course in human affairs", supplanting naturally occurring means and ends with the projector's own?

[145] Smith, TMS IV.ii.2.14-16

"Systems" are the single thread which runs clear through all the various inflections of meaning layered on projector throughout the 17th and 18th century. Francis Bacon earned his fame not for discovering the properties of this or that chemical compound; he did so by establishing a system of inquiry. So too were legislative reformers Lycurgus and Solon famed for their systems of government. John Law proposed a system of finance.

One such frequently mentioned system is religious education, which, for Smith, provides the basis of a society's understanding of justice. When a single system is imposed wholesale upon a society it often operates, as Smith says, "in the highest degree of disorder." His solution is to enable religious systems to compete with one another and force them to cooperate among themselves.[146]

Another problem with projectors, when they were operating within the world of finance, is that joint-stock companies were vulnerable to principal-agent problems. Like-minded projectors were obliged to deputize an individual to make decisions for them to streamline the decision-making process, whether from within their own ranks, or an individual more familiar with the operations of the industry there were entering into. These agents were then capable of deceiving the principals and directing effort into unprofitable activities.

[146] Smith, WN V.i.197

> Notwithstanding the most upright intentions, the unavoidable partiality of their directors to particular branches of the manufacture of which the **undertakers mislead and impose upon them** is a real discouragement to the rest, and necessarily breaks, more or less, that natural proportion which would otherwise establish itself between judicious industry and profit, and which, to the general industry of the country, is of all encouragements the greatest and most effectual.[147] [**Emphasis Added**]

The size and scope of large financial institutions require some principal-agent relationship between shareholder and operating executive; even when the projectors are seriously minded, they must rely on individuals who do not share their own interests. When the directors of the Ayr Bank published "Precipitation and Fall of Mssrs Douglas, Heron, and Company" in 1778, the misconduct of the individual branch managers was offered as a central excuse for the outcome, precisely the problem Smith highlighted two years earlier in the first edition of Wealth of Nations.[148]

3.3.i A Digression on "Chimera"

To this point much has been said of projectors, but little has been said about a word commonly associated which, when examined, illuminates our understanding about how

[147] Smith, WN 5.I.iii.1.b.40

[148] "…we are sorry to say, that our misfortunes have in a great degree been occasioned, not by mere error and imprudence, but by an open disregard, not only of the principles of the Copartnery, but of the express and positive
rules and regulations laid down for the conduct of the Managers; and we do therefore apprehend, that, in so far as this charge can be established by legal evidence, and the damage thence arising properly qualified, the Managers of the Company ought to be liable in redress to their injured Fellow-partners." Precipitation and Fall, p.34

projectors are being used in context. The word is “Chimera”, and it deserves a short digression with illustrations about its usage contemporary with Smith. To this purpose, three sources close to Smith were examined: David Hume, Samuel Johnson, and John Locke. Ultimately, we shall see that the Chimera, and its adjective chimerical, have to do with imagination absent experience, and a measure of grandeur or magnitude about what was imagined.

The mythological Chimera was the offspring of Typhon and Echidna, and killed by Bellerophon mounted upon the winged horse Pegasus with a lead-tipped spear.[149] It is the combination of multiple animals, often three; the classic depiction has a lion’s head, a goat head springing from its back, and a snake for a tail. [150]

[149] The intersection of chimeras, projectors, and alchemists makes the mythological Chimera’s death amusing: if the chimera represents the fancy of one’s imagaintion, then Bellerophon’s lead spear suggests that practical attempts to transmute lead into gold via heat would kill the fiction. In other words: theory must be tested by experience. This would not have been aparrent to the Greeks, however. Until Dante Allegheri’s chimerical monster Geryon transported Vergil and Dante between the 7th and 8th circles of hell, the chimera was not associated with alchemy and fraud but feminine witchcraft.

[150] Bellerophon Roman mosaic from Autun (Saône-et-Loire, France) at the Musée Rolin

Fig. 2.3: Bellerophon Roman mosaic

18th Century depictions varied in their presentation, such as this engraving depicting the Chimera as a skeletal creature devouring the man in its clutches, with one bird's head and two devils heads.[151]

[151] The Chimera (La Chimère de Monsieur Desprez) ca. 1777–84; Louis Jean Desprez French

Fig. 2.4: Louis Jean Desprez, La Chimère (c.1777-1784)

The Chimera becomes associated with fraud in Dante Alleghri's Divine Comedy in the monster Geryon, the guardian of Malbolge. It permitted Vergil and Dante to ride from the 7th circle of hell occupied by the violent to the 8th circle of hell of those sinners who committed fraud.

> And that foul image of deceit came on,
> and landed on the bank its head and chest;
> but o'er the edge it drew not up its tail.
> Its face was as the face of a just man,
> so pleasing outwardly was its complexion;
> the body of a serpent all the rest.
> Two paws it had, all hairy to the arm-pits;
> its back and breast, as well as both its sides,
> were painted o'er with snares and wheel-like shields.

Ne'er with more colors in its woof and warp
did Turks or Tartars manufacture cloth,
nor by Arachnne were such webs designed.
As flat-boats sometimes lie upon the shore,
in water partly, partly on the land;
and as among the greedy Germans yonder,
the beaver seats himself to wage his war;
so lay that worst of beasts upon the edge
which closes in the sandy plain with stone.
All of its tail was quivering in the void,
and twisting upward its envenomed fork,
which like a scorpion's weapon armed its tip.[152]

[152] Dante Alighieri, The Divine Comedy, Inferno, Canto XVII
Inset: Descent Into The Abyss On Geryons Back Inferno, Canto 17, Gustave Dore (1861)

Fig. 2.5 The Chimera Geryon carries Vergil and Dante

Before Dante's Geryon chimeras had been associated with feminitiy and witchcraft; Dante's depiction of the creature as male was novel, as was its association with fraud.

David Hume uses “chimera” and its cognates 67 times in his corpus, more often than he uses “projector”. Though some of its uses are vague, others make it clear that a chimera is a product of the imagination: something that does not exist in nature and has never been experienced with any senses.

> ’Tis obvious all this chain of argument or connexion of causes and effects, is at first founded on those characters or letters, which are seen or remember’d, and that **without the authority either of the memory or senses our whole reasoning wou’d be chimerical and without foundation.** Every link of the chain wou’d in that case hang upon another; but there wou’d not be any thing fix’d to one end of it, capable of sustaining the whole; and consequently there wou’d be no belief nor evidence. And this actually is the case with all hypothetical arguments, or reasonings upon a supposition; there being in them, neither any present impression, nor belief of a real existence.[153]

> On the other Hand, Learning has been as great a Loser by being shut up in Colleges and Cells, and secluded from the World and good Company. By that Means, every Thing of what we call Belles Lettres became totally barbarous, being cultivated by Men without any Taste of Life or Manners, and without that Liberty and Facility of Thought and Expression, which can only be acquir’d by Conversation. **Even Philosophy went to Wrack by this moaping recluse Method of Study, and became as chimerical in her Conclusions as she was unintelligible in her Stile and Manner of Delivery**. And indeed, what cou’d be expected from Men who never consulted Experience in any of their Reasonings, or who never search’d for that Experience, where alone it is to be found, in common Life and Conversation?[154]

> A state is never greater than when all its superfluous hands are employed in the service of the public. The ease and convenience of private persons require, that these hands should be employed in their service. The one can never be satisfied, but at the expence of the other. As the ambition of the sovereign must entrench on the luxury of individuals; so the luxury of individuals must diminish the force, and check the ambition of the sovereign.
> …
> **Nor is this reasoning merely chimerical; but is founded on history and experience**. The republic of Sparta was certainly more powerful than any state

[153] Hume, Treatise on Human Nature 1.3.4.2
[154] Hume, Essays, Moral, Political, and Literary III.I.4

> now in the world, consisting of an equal number of people; and this was owing entirely to the want of commerce and luxury.[155] [**Emphasis added**]

A statement is not chimerical when it is grounded in experience. Chimeras are hypotheticals; suppositions. They are creations of the mind, not of empiricism. When Hume talks of "chimerical projectors", he's talking about individuals who have propositions for inquiry and investment who themselves lack any experience with the industry they themselves propose to enter into.

The words Hume uses in association with chimeras are similarly consistent on that theme. Of the 36 uses of chimera as an adjective, the plurality have to do with hypothetical thinking: 14 times he uses words like reasoning, argument, speculations, conclusions, supposition, and disquisition. When paired with another adjective, as in the form, "chimerical and __", the words following denote (ungrounded) thought: without foundation; pretense; wild fancies; imagined; presumptuous. Several times, as in the last example above, Hume asks his reader not to dismiss the chain of reasoning as chimerical, because though it seems to be, it is, in fact, grounded in reality, senses, and experience.

Hume, one of the great champions of empiricism in the 18th century, clearly laid out in his prose that the chimera was his own personal methodological opponent: a creature of pure reason, pure fancy, and unconstrained except by the thinker's imagination.

[155] Hume, Political Discourses, Essay 1 "Of Commerce", 6-7

English lexographers agreed with Hume's usage. Samuel Johnson's Dictionary defines Chimera as, "A vain and wild fancy as remote from reality as the existence from the poetical Chimera, a monster feigned to have the head of a lion, the belly of a goat, and the tail of a dragon."[156] Thomas Sheridan offers, "A vain and wild fancy" for Chimera; for Chimerical he adds, "Imaginary, fantastic."[157]

Johnson cites John Locke in his Dictionary quoting from the Essay on Human Understanding. "Nobody joins the voice of a sheep with the shape of a horse; or the colour of lead with the weight and fixedness of gold, to be the complex ideas of any real substances; unless he has a mind to fill his head with chimeras, and his discourses with unintelligible words."[158] Here Locke gives us the final link needed to understand Chimera's role in projectors, and how they fit into a Smithian system of entrepreneurship: Locke does not doubt the existence of sheep or horses, they are real enough. What is fictional and imaginary is the combination of disparate elements.

But for Smith the combination of dissimilar elements was part of the division of labor laid forth in the first chapter of the book.

> All the improvements in machinery, however, have by no means been the inventions of those who had occasion to use the machines… some [have been made] by that [intenuity] of those who are called philosophers or men of speculation, whose trade it is, not to do any thing, but to observe every thing; and

[156] Johnson, Dictionary (1755)
[157] Sheridan, General Dictionary of the English Language (1780)
[158] Locke, Essay Concerning Human Understanding (1690)

> who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects.[159]

New combinations further the division of labor and increase productivity, enriching the nation.

This would seem to provide another passage Bentham could quote against Smith: if projectors are subject to the chimera, and the chimera is a combination of disparate things, and combining disparate things is a result of the division of labor, then either projectors are benefactors by innovating potential new combinations, or Smith has argued against the deepening of the division of labor. Smith either should embrace projectors as Bentham does, or he becomes inconsistent, as history has read him since 1787.

Not so, however. These men of speculation "observe every thing". This is an empirical activity, grounded in viewing reality; chimeras are divorced from reality. For Smith, therefore, one's status as being chimerical has less to do with whether you combine separate elements, but whether you have experienced firsthand the separate elements you intend to combine. The Earl of Sandwich was familiar with both bread and roast beef when he first asked for slices of beef to be pressed between bread; he knew his hands would stay cleaner so he could continue at cards. He may have been a man of speculation, but not chimerical.

[159] Smith, WN I.i.9

Returning to Douglas, Heron, and Company: none of the shareholders were bankers or men of finance when they designed their project to revolutionize credit in Scotland. Though banking certainly existed, their ideas about what they could do to revolutionize it cannot have come from experience; it must only have come from their imaginations. These projectors, having abstained from observation, become chimerical.

Why might large-scale combinations be more subject to the chimera than small scale? Consider the Darien Scheme: what experience had anyone had in the late 17th century at digging a canal across such a broad isthmus halfway across the world? An assumption of constant returns to scale may well lead you astray: construction projects don't scale linearly. Building a 15 story apartment building requires considerations you simply don't have to make for a 1 story rancher. Consider John Law's Mississippi Scheme: what experience had Law in the operations of basing bank notes on agricultural output? Though he flattered the physiocratic theory that wealth was based in land, he neither was a farmer or familiar with the price fluctuations of grain. Nor indeed did he seem to realize that increasing output would lower price on the margin, as Smith did.[160]

Grand designs can indeed be achieved: astronauts have walked on the moon. But the process of getting to the moon did not begin by designing the Saturn V rocket: it took small steps from the V2, through Saturn I, to IB, finally to V. Incremental increases in

[160] Smith talks about the folly of gold and silver mining expeditions in the Americas in WN IV.vii.a.18-19. Though the prospectors were frustrated in their ability to discover great lodes of metal, even if they had, the new relative abundance of metal would depress the price per unit.

magnitude can acquaint the projector with problems associated with scaling and focus problem-solving efforts. Incremental problem-solving simply isn't a possibility for grand projects conceived in the imagination.

3.3.ii A Digression on "Undertakers"

Chimeras of the imagination will help put the last piece in place to understand projectors' role in commerce and why they might not be desirable debtors; though Smith scholarship has read "projector" as "entrepreneur" since Bentham, a serious issue arises: there already was an English word for entrepreneur: "undertaker". Undertaker is a direct transliteration of entrepreneur from the French which Smith makes use of throughout Wealth of Nations.[161] Undertaker was also the word for commercial activity chosen by Richard Cantillon in his only surviving work on economics, Essai sur la Nature du Commerce in Général, and it is to Cantillon we turn for illumination.[162]

Before we look at the text itself, the history of the text deserves notice. Cantillon died 1734;[163] the Essai was first published posthumously in 1755 in French. But Cantillon's

[161] Smith uses "undertaker" in 15 passages in WN, twice as often as projector. But like projector, Smith does not use undertaker as a noun anywhere else in his published work; he does use the verb forms "undertaking" and "undertook".

[162] Smith references Cantillon directly in WN I.viii.15; Cantillon's influence on Smith have been explored in West (1980) and Brewer (1992).

[163] The circumstances of Cantillon's death are worthy of modern tabloids. He was allegedly murdered by a jilted lover before she set his home on fire. However, some reports also place him some time later under an assumed name in South America; he may have staged his death to better flee pursuers, possibly after him for his role in the collapse of John Law's Mississippi Scheme some ten years earlier. (Cantillon 1755, p xiii, xiv)

words appeared in print earlier in English: Malachy Postlethwayt possessed a draft in English that without attribution he used, and in parts entirely copied, the text of Cantillon's Essai in his publication of The Universal Dictionary of Trade and Commerce (1751).[164] Adam Smith possessed a copy both of the Universal Dictionary, as well as a copy of the French Essai.[165] It is not clear whether the Essai was first composed in English or in French.[166] Whichever was the original language of composition, neither work includes the term projector, though projector had been in use for more than 70 years in English, and projetter in French for 100. In all cases Cantillon uses entrepreneur in the French; undertaker in the English.

Cantillon characterizes undertakers as having a singularly specific quality: undertakers are those who purchase at certain prices in order to sell at uncertain prices. That is to say, undertakers bear the burden of uncertain future market conditions. "The farmer is an entrepreneur who, without any certainty about what advantages he will derive from the enterprise, promises to pay the [land]owner a fixed sum of money."[167] Farming is hardly a new course of endeavor to qualify as innovative. Cantillon continues: "The city consumes

[164] Cantillon xv; Cantillon's cousin Phillip Cantillon also published "The Analysis of Trade Commerce, Coin, Bullion, Bank, and Foreign Exchanges" in 1759, attributing the work to a manuscript of Richard Cantillon's; Smith did not possess a copy of this work.
[165] Mizuta (2000)
[166] Richard van den Berg (2012) argues that the English manuscript was longer and subsequently translated and reduced later into the French. Antonin Murphy (1986) places the book as part of Cantillon's legal defence against charges of usury brought by Joseph Gage in French court, drawing a distinction between usurious loans and foreign exchange; such a defense would naturally have been originally composed in French.
[167] Cantillon p.24; the translator Murphy substitutes "entrepreneur" for undertaker throughout the prose for the ease of understanding for modern audiences; he acknowledges the equivalence of the terms in his introduction, p xviii.

more than half of the farmer's commodities. He brings them to the market there, or he sells them in the nearest town, or else some others become entrepreneurs by acting as carriers…. The daily changes in the urban prices of commodities, however, make their profit uncertain." Again, transportation of commodities is not a new industry.

For Cantillon, the primary concern of entrepreneurs – of undertakers – was not innovation, but uncertainty. The entrepreneur was he who, in buying at certain and selling at uncertain prices, bears the burden of uncertainty. Indeed, this definition of entrepreneurship survives: Heyne et al's "Economic Way of Thinking" includes selling known goods in different locations as one expression of entrepreneurship.[168]

The undertaker's assumption of the burden of uncertainty appears directly in WN: "In exchanging the complete manufacture either for money, for labor, or for other goods, over and above what may be sufficient to pay the price of the materials, and the wages of the workmen, something must be given for the profits of the undertaker of the work who hazards his stock in this adventure."[169] The undertaker hazards; the undertaker risks; he does so whether or not what he is doing involves innovation.[170]

[168] Heyne p. 24 (2013)
[169] Smith, WN I.vi.5
[170] Smith further links undertakers as employing their own fixed and circulating capital in WN II.i.12; II.ii.25; II.iii.4; IV.vii.b.3

However, Smith adds a tactile element to undertakers: undertakers are those who conduct the operations of a commercial endeavor. When Smith mentions how projectors face principal-agent problems, it is the undertaker qua agent – the person carrying out business operations – who can deceive them.[171] As much as Cantillon separated the landlord and the farmer qua entrepreneur in the Essai, Smith separates the proprietor and the undertaker of mining operations[172]. Fisherman[173] and diggers of canals[174] were similarly undertakers. This tactile element suggests a degree of first-hand experience; of real-world observation; of absence of the chimera.

Understanding how undertakers fit into Smith's work allows us to better define the role projectors played: the projector creates the vision of the endeavor; the projector combines, possibly, disparate elements *vis a vis* men of speculation; the undertaker hazards his capital; the undertaker does the actual work of the endeavor. Certainly it is possible for a single individual to play each of these roles in the same way that Clint Eastwood both produced and directed 1992's Unforgiven,[175] but we would surely never say that the producer and the director were the same.

These differences inform our understanding of his explanation of discounting bills of exchange: both projectors and undertakers drew bills. Smith's use of undertakers as those

[171] Smith, WN 5.I.iii.1.b.40
[172] Smith, WN I.xi.b.13, 18, 25, 26
[173] Smith, WN IV.v.35
[174] Smith, WN V.i.3.i.b.35
[175] Eastwood, Unforgiven (1992).

who borrow as a portion of their fixed and circulating capital[176] suggest their relatively high degree of capitalization; they are "real debtors". They have sufficient assets to restore creditors to whole. Projectors, on the other hand, have no capital requirements: they operate upon imagination.

Similarly, this informs the distinction Smith drew between private and public prodigality: "Great nations are never impoverished by private, though they sometimes are by public prodigality and misconduct."[177] The difference here is that private persons are forced to spend down their own capitals. Even if this personal prodigality ruins the individual, it cannot ruin the state: "the profusion or imprudence of some being always more than compensated by the frugality and good conduct of others."[178] The "public extravagance of government"[179] is unconstrained in its ability to ruin. This sentiment is explored fully in the final chapter of WN, Of Public Debt, where he comments upon the tendency of expenditures to rise to meet revenues, leading to wartime debt contraction, and, eventually, the stifling of commercial activity. And though Smith was an advocate of the 1707 Act of Union, he cannot have been ignorant of the part the Darien Scheme, a project to cut a canal through modern Panama, played in eroding resistance by bankrupting the heavily invested Scottish government.

[176] Smith, WN II.ii.58
[177] Smith, WN II.iii.30
[178] Smith, WN II.iii.27
[179] Smith, WN II.iii.31

None of this is to say that projectors are per se harmful and vicious, and undertakers are per se honourable and beneficial: as before deceitful undertakers can mislead earnest projectors; projectors qua men of speculation are one of Smith's engines of the division of labor. Rather, here we see how inappropriate Bentham's allusion to Marcus Curtius was: Smith's worry is not at all that individual innovators would risk their own capital in any particular venture. He's worried that individuals, unfamiliar with the operations of an industry, would enter into it under-capitalized. In the event these individuals are government agents, or have sufficient influence to appeal to government authority to write off debt, the imprudence of projectors would tend to destroy the capital of the nation, not merely his own.

3.4 The Reconstructed Projector in Smith's Model

Projectors, chimerical or not, and undertakers present a heterogeneous distribution of types of agents within a market. There are bad debtors and good debtors, but this is insufficient to justify usury laws: "I have made it, I hope, pretty apparent, that these restrains have no power or tendency to pick out bad projects from the good."[180] For price ceilings to have a tendency to exclude one debtor over another, market agent heterogeneity must also possess an uneven distribution along prices of projectors and undertakers.

[180] Bentham, DU XIII

Smith commonly appeals to differences of individuals within markets, so a credit market with uneven distributions is hardly surprising. In a passage concerning bounties for fisheries, Smith comments that "the usual effect of such bounties is to encourage rash undertakers to adventure in a business which they do not understand, and what they lose by their own negligence and ignorance more than compensates all that they can gain by the utmost liberality of government."[181] Smith also notes the different temperaments among market agents: merchants are daring while gentlemen are staid[182]; by virtue of their geographic locations merchants fall tempted to monopolize to a greater degree than gentlemen;[183] the lower and middling stations of life produce a frugal and industrious morality, while the parlors of the nobility incent flattery, fashion, and falsehood.[184] Bounties systematically attract rash undertakers – which is to say that absent the bounty the undertakers would be prudent ones; geography and industry systematically produce different tendencies among gentlemen and merchants; social rank systematically produces different moral proprieties. It could hardly be surprising then that Smith would believe that in the distribution of debtors, the tail-end would be comprised largely, if not entirely, by the rash, the chimerical, the ignorant, the prodigals, the projectors.

Beyond the existence of different types of market agents, differing industries themselves attract and are possessed to a greater or lesser degree of sober and chimerical participants.

[181] Smith, WN IV.5.35
[182] Smith, WN III.iv.3
[183] Smith, WN IV.ii.21
[184] Smith, TMS I.3.iii.5-6

Absent the bounty, the fisheries previously mentioned would be free of rash undertakers: losses would mount and they would find themselves bankrupt. Lotteries however, insofar as an industry may be characterized as a lottery, tend to attract the rash and chimerical. Smith treats gold and silver mining in the Americas as such a lottery:

> Of all those expensive and uncertain projects, however, which bring bankruptcy upon the greater part of the people who engage in them, there is none perhaps more ruinous than the search after new silver and gold mines. It is perhaps the most disadvantageous lottery in the world, or the one in which the gain of those who draw the prizes bears the least proportion to the loss of those who draw the blanks: for though the prizes are few and the blanks many, the common price of a ticket is the whole fortune of a very rich man. … Such in reality is the absurd confidence which almost all men have in their own good fortune that, wherever there is the least probability of success, too great a share of it is apt to go to them of its own accord.
>
> But though the judgement of sober reason and experience concerning such projects has always been extremely unfavorable, that of human avidity has commonly been quite otherwise. The same passion which has suggested to so many people the absurd idea of the philosopher's stone, has suggested to others the equally absurd one of immense rich mines of gold and silver.[185]

Reason and experience tend to restrain; avidity, optimism, and the magnitude of the reward spur onward. As much as the minister in an ostentatious court would construct a magnificent highway to the neglect of commercial roads because of its visible magnificence,[186] the imagined magnificence of wealth in mining, despite the narrow odds, draws the attention of optimistic undertakers and projectors. As the grandness of the reward increases – not discounted for the probability of failure – the industry systematically attracts the rash, the inexperienced, and the chimerical.

[185] Smith, WN, IV.vii.a.15
[186] Smith, WN, V.i.d.16

It should be utterly uncontroversial to say that the world of finance possesses both the market participants who, by habit and inclination, tend towards boldness and daring, and institutional structure that enables projects of low probabilities of successfully attaining magnificent rewards. Financing the Darien Scheme ended Scottish independence; Douglas, Heron, and Company nearly ruined Henry Scott; financing the Forth and Clyde Canal nearly ruined Queensberry;[187] the Mississippi Scheme ruined credit in France; the South Sea Bubble was pure theft. As interest rates vary inversely to the likelihood of success, such projects and such projectors would tend to dominate the tail-end of the distribution. If so, Bentham is mistaken that non-binding price ceilings could discriminate between good projects and bad.

Curiously, though the lottery of mining precious metals possesses qualities Smith uses to justify usury price ceilings, he does not approve of legal prohibitions in the case of mining: "[Mines] are projects, therefore, to which of all others a prudent lawgiver … would least choose to give any extraordinary encouragement, or to turn towards them a greater share of that capital than that would go to them of its own accord."[188] The only thing prudent governance would do is abstain from subsidizing, despite the

[187] Joseph Priestly, A Historical Account of the Navigable Rivers, Canals, and Railways, of Great Britain (1831). In Richard Saville's "History of the Bank of Scotland" p.162, he describes how Charles Douglas, 3rd Duke of Queensberry and uncle to Henry Scott, was a charter member of The Company of Proprietors of the Forth and Clyde Navigation which raised £150,000 for the completion of the construction. By 1775 funds had run dry 6 miles from completion. Acts of Parliament granted an additional £50,000 to complete the project by 1790.

[188] Smith, WN, IV.vii.a.15

overwhelming likelihood of engagement in that project leading to the diminution of a nation's capital. But finance deserves special attention and regulation? I suggest it is the quality of financial markets that not only does finance fund vain and chimerical projects; not only do agents deceive honorable principals; not only do extravagant rewards tempt otherwise sober people towards folly; but the courts of princes may be persuaded through the influence of habitual sympathy to assume ruinous private debts upon the public revenue. A price ceiling that leaves the greater part of sober debtors unbothered, and rations credit away from the greater part of chimerical projectors will work to enhance the Wealth of Nations.

3.5 Conclusion

200 years of scholarship has wondered how Smith could have been so inconsistent to recommend price ceilings on interest rates. They have been misled by Jeremy Bentham into thinking that projectors, like Marcus Curtius, risk their own in the bargain. Through the evolution of language they have forgotten that projector was not merely the old word for the late 19th century adoption of entrepreneur, but rather someone whose imagination devised plans of works or systems. They failed to apply Smith's models of heterogeneous market agents and industry incentives that make financial markets particularly susceptible to externalities and systematic failure.

Smith's advocacy for usury was perfectly consistent with his model of human relationships he built in TMS, and the language he used to describe both merchants and risky endeavors that promise great rewards in WN. Given the performance of Scotland's financial markets over the 18th century until the elimination of usury laws in the 19th,[189] it's hard to argue that markets can't flourish with such regulation; this is even more evident when Douglas, Heron, and Company's proliferation can be traced not to widespread market acceptance of their banknotes, but to a moment of political connection.[190] Indeed, it is perhaps because of the greater susceptibility of credit markets to sympathetic influences that usury restrictions become that much more necessary to discourage projectors.

Because Bentham's criticism failed to address Smith's understanding of projectors, his solution – namely, repealing interest rate price ceilings – may not account for the problems Smith foresaw. It becomes a new question as to whether or not a generally non-binding price ceiling can effectively ration credit away from Smith's projectors; and whether such rationing leads to improved growth and the avoidance of speculative crashes. This is the question I will pursue in the subsequent chapter.

[189] An Act to repeal the Laws relating to Usury and to the Enrolment of Annuities 1854 c. 90

[190] The Bank of Scotland refused to accept Bank of Ayr notes for the first 9 months of operation until March of 1770, when Henry Dundas, a political ally of Henry Scott, was elected to the Bank of Scotland's Board of Governors. After the election both the Bank of Scotland and the Royal Bank of Scotland accepted Ayr notes at par, and extended Ayr a generous line of credit. It was only at this point that Ayr notes began circulating so widely. See Saville's History of the Bank of Scotland.

4. Welfare Enhancing Usury Restrictions

This chapter uses a Constant Elasticities of Substitution function to model agents' internal relative utilities when presented with risks that potentially yield both reclusive and sympathetic rewards, converting the two sources of utility into a single-dimension willingness to pay. These agents offer interest rates as bids on investment funds depending on their perceived utility gain. Lenders maximize the loan portfolio's expected profits. Interest rate price ceilings are imposed on this market to compare aggregate performance among price ceiling regimes, and the process repeated. The results demonstrate interest rate price ceilings theoretically may be efficacious at excluding sympathy-seeking agents from credit markets, improving overall economic growth.

4.1 Introduction

The last half of the 18th century produced three main arguments regarding the optimal price ceiling on interest rates. Sir James Steuart argued in *Principles of Political Economy* (1767) that economic growth was best encouraged by setting a ceiling below the presiding market rate; such a ceiling would lower the rate of interest and spur production.[191] He observed that the presiding rate of interest in the Netherlands was lower than that of Great Britain, and the economy flourishing. Once the rate of usury were lowered, prosperity would follow. Adam Smith rejected Steuart's reasoning in *Wealth of Nations* (1776) by reversing the causality: it was the preponderance of capital relative to its available uses that led to its lower market price. The key to growth was instead the productivity gains from a deeper division of labor, and imposing a binding price ceiling on credit markets would damage that division and restrict growth, as it did in France.[192]

Smith did agree with Steuart that a rate ceiling should exist, but instead of advocating a generally-binding ceiling, Smith advocates for a non-binding ceiling; at least, a price ceiling that does not bind the part of the market made up of people of good credit, but does bind high risk markets, and markets made up of people with poor credit or habits of profligate spending. "If the legal rate of interest in Great Britain, for example, was fixed

[191] Steuart, Principles of Political Oeconomy, ii.128
[192] Smith, WN I.ix.9

so high as eight or ten per cent, the greater part of the money which was to be lent would be lent to prodigals and projectors, who alone would be willing to give this high interest."[193] Prodigals represent those who borrow in order to finance consumption spending and according to Smith "will soon be ruined, and he who lends to him will generally have occasion to repent of his folly."[194] Projectors referred to a type of borrower with large-scale plans of magnificent design though lacking experience proportional to the difficulty of the task, and were often accused of deceiving either themselves or those persuaded to contribute finances.[195]

Adam Smith's advocacy of any usury ceiling therefore seems contradictory: why would Smith disrupt the market for debt financing when innovation is one of the driving factors of his division of labor? This contradiction was most famously question by Jeremy Bentham in *Defense of Usury* (1787). There Bentham takes Smith's own analysis of prices from other parts of WN, and applies it to the market for credit, coming to the conclusion that the best price ceiling is no price ceiling.[196]

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[193] Smith, WN II.iv.15

[194] Smith, WN II.iv.2

[195] This definition of projector is non-standard and relies on evidence presented in Middleton "Projectors as Chimerical Men of System" and "The Transformation and Deception of Projectors". The current understanding of projector as an entrepreneur willing to take on higher risk investments is rooted in Jeremy Bentham's "Defense of Usury", as can be seen in the evolution of editorial comments to Book II, Chapter iv of the Wealth of Nations. William Playfair in his 1811 edition comments that the principals of the Bank of Ayr were indeed projectors, unfamiliar with the industry and trusting to gains made from great projects. In McCulloch's 1828 and Wakefield's 1835 editions, however, Bentham's response in *Defense* had become standardized: McCulloch summarizes Bentham's arguments, and Wakefield reprints Letter XIII in full as "Note on Chapter IV, Book II". Both McCulloch and Wakefield present projectors as industrious entrepreneurial venture capitalists. Unfortunately, modern commentary anachronistically applies Bentham's definition to Smith and prior writers, which clouds our understanding of Smith's intentions to employ price ceilings to exclude projectors from credit markets.

[196] Bentham DU XIII.44

Smith's justification for the exception in credit markets may be found in *Theory of Moral Sentiments* (1759):

> Men in the inferior and middling stations of life, besides, can never be great enough to be above the law, which must generally overawe them into some sort of respect for, at least, the more important rules of justice.
> …
> In the superior stations of life the case is unhappily not always the same. In the courts of princes, in the drawing–rooms of the great, where success and preferment depend, not upon the esteem of intelligent and well informed equals, but upon the fanciful and foolish favour of ignorant, presumptuous, and proud superiors; flattery and falsehood too often prevail over merit and abilities. In such societies the abilities to please, are more regarded than the abilities to serve. TMS I.3.iii.5-6

Institutions shape the dominant strategies of agents within them, and though individuals from the middling and the superior station of life might perform the same action, their motivations may differ. The honest merchant and the preferment-seeking aristocrat meet in one place: credit markets; the one to fund his sound venture, the other to increase his prestige at court. Such heterogeneous motivations may indeed distort market outcomes, making Bentham's assertion that price ceilings are always an evil stand on less solid ground.

Benefits procured in "the drawing-rooms of the great" share characteristics with monopoly rents. When choosing a retainer to advance from among his retinue, the favor of a "proud, presumptuous superior" represents a positional good: it does no good to be the second-most preferred retainer in competition with the most-preferred. And because preferment falls upon not him with the greatest objective merit, but he who is most subjectively favored, competitors' efforts will be focused on flattery rather than productivity. In the same way Hollywood advertising for Oscar-nominated but Oscar-

losing movies fail to win the applause embodied in the statuette, retainers' non-superlative efforts go unrewarded. This suggests that even successful investments, when directed towards the sympathetic gains of applause and preferment, may represent social losses in a process of rent dissipation.[197]

Furthermore, court members each have an incentive to engage in activities that can offer them sympathetic positive externalities.

> In France, however, the great post roads, the roads which make the communication between the principal towns of the kingdom, are in general kept in good order … But what we call the cross-roads, that is , the far greater part of the roads in the country, are entirely neglected, and are in many places absolutely impassable for any heavy carriage. … The proud minister of an ostentatious court may frequently take pleasure in executing a work of splendor and magnificence, such as a great high-way which is frequently seen by the principal nobility, whose applauses, not only flatter his vanity, but even contribute to support his interest at court. But to execute a great number of little works, in which nothing that can be done can make any great appearance, or excite the smallest degree of admiration in any traveler, and which, in short, have nothing to recommend them but their extreme utility, is a business which appears in every respect too mean and paultry to merit the attention of so great a magistrate.[198]

If both the highway and the crossroads require the same capital investment and produce the same reclusive return on their investments in the form of increased economic activity, the additional sympathetic benefit to the minster makes the choice obvious from his point of view and the public would be indifferent, injection effects notwithstanding. But the sympathetic benefits produced by the majesty of the highway and the status of the patrons traveling upon it recommend the highway project over crossroad maintenance even were

[197] Tullock, Welfare Costs of Tariffs, Monopoly, and Theft (1962)
[198] Smith, WN V.i.d.16

the crossroads to have a higher relative return to investment. Not only is sympathetic applause gained by the minister subject to rent dissipation as it enters in competition with the flattery of other courtiers, but the productive capacity of the nation as a whole is diminished as finances flow towards low-return/high-sympathy investment.

Is Smith's non-binding ceiling even potentially effective at rationing credit away from sympathy-seekers? This is the question the paper seeks to test: given agents with varying preferences over reclusive and sympathetic gains from risk-taking, can a price ceiling improve overall economic growth by rationing credit away from borrowers pursuing positional sympathetic gains.

4.2 The Model

In this model debtor agents possess preferences over both reclusive monetary returns and sympathetic returns. These debtors are not subject to budget constraints.[199] Each agent perceives an opportunity to receive a two-dimensional reward bundle with a known risk profile: a gamble. Their participation in the credit market to finance the opportunity is dependent upon characteristics of a bundle of sympathetic and reclusive rewards, and

[199] This non-standard approach to modeling purchasers of credit without budget constraints follows the line of caricature models described by Gibbard and Varian (1978) in order to focus more clearly on the changes in behavior arising from a change in assumptions about agent preferences between sympathetic and reclusive payoffs. As the 18th century literature from which this model is drawn did not support strong assumptions regarding the disposition of budget constraints between sympathy-seeking and non-sympathy-seeking debtors, and because a particular assignment of constraints might obscure the effect of sympathetic preferences we felt this was the most prudent line of inquiry.

their own relative preferences for each type of reward. The Constant Elasticities of Substitution production function allows us to compress this two-dimensional payoff structure down into a single dimension, reclusive financial rewards, which signifies an amount of money (pure reclusive rewards) equivalent to the two-dimensional reward bundle offered by the gamble. The agents' one-dimensional willingness to pay reflects their two-dimensional utilities, and enables creditors to direct funding towards those debtors that offer them the highest bids, subject to discounting based upon the (reclusive) fundamentals of the gamble. This credit allocation generates a portfolio of all funded gambles in the market. This portfolio of all financed gambles is run, and the reclusive returns generate a growth rate of the market. Because price ceilings interrupt creditors' ability to accept high bids in exchange for funding, we re-run the simulation with the same pool of debtors and gambles to generate a new portfolio, one affected by a price ceiling. By controlling the changes of global parameters of the market, the assumptions governing the willingness of agents to substitute between sympathetic and reclusive goods, and the particular price ceiling, we are able to assign causes to differences in market growth.

The inclusion of sympathetic exchange forces us to reconsider expected gains valuations and the individuals involved, either debtors or creditors, may fund or seek funding based upon margins outside of traditional analysis. We employ a CES production function to model each of the 1,000,000 agents' willingness to substitute between the two kinds of payoffs as in *Fig.1*.

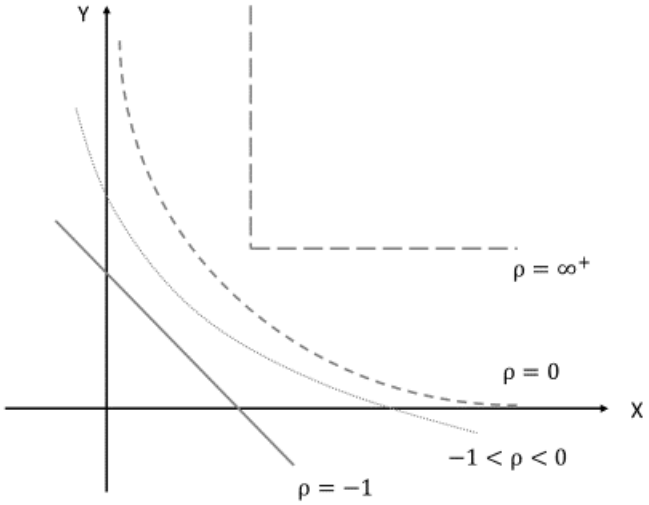


Fig. 3.1: CES elasticities of substitution by ρ

CES production functions allows us to model lexicographic preferences ($\rho = \infty^+$) to perfect complimentary preferences ($\rho = -1$), and all possibilities between. Because the one-dimensional equivalence to a two-dimensional bundle requires the function to include a horizontal intercept, the behavior of CES functions obliges us to restrict ρ, the substitution parameter, to [-1,0) for the purpose of tractability: ρ>0 would eliminate the horizontal intercept and produce an agent willing to forsake a fortune in reclusive goods for an infinitesimal of sympathy, and an infinitely high willingness to pay for any project. While we do not declaim such preferences might exist, we believe elevated willingness to pay is sufficiently modeled with $\rho_i \in$ [-1,0). For simplicity sake, ρ is modeled as being distributed uniformly between [-1,0) among agents, when those agents have preferences for sympathetic goods. Figures 3.2 – 3.8 in this section employ a linear CES function for illustrative purposes only.

Standard economic analysis looking only at reclusive goods would model an agent's willingness to pay by comparing the cost of entering the gamble (the Ante, A) with the reclusive return (R) to the gamble, as in Fig. 2.

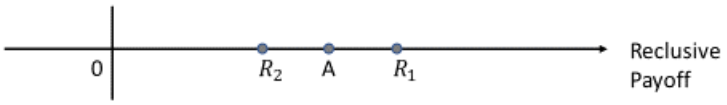


Fig. 3.2: One Dimensional Willingness to Pay

If $R_i > A$, the risk-neutral agent would expend A in order to gain the expected R. If $R_i < A$, the agent withholds his investment capital. The relative positions of R_i and A generate an interest rate the agent would be willing to pay on funds borrowed for the purpose of making the gamble, which we designate $\gamma = \frac{R_i}{A_i} - 1$. As before, a positive γ indicates an agent willing to borrow funds to finance the gamble, a negative indicates unwillingness.

Combining standard reclusive analysis with agents' substitution between sympathetic and reclusive payoffs yields agents potentially willing to fund gambles with negative reclusive rewards and positive sympathetic rewards, as in Fig. 3, and potentially even preferred to gambles with strictly positive reclusive rewards.

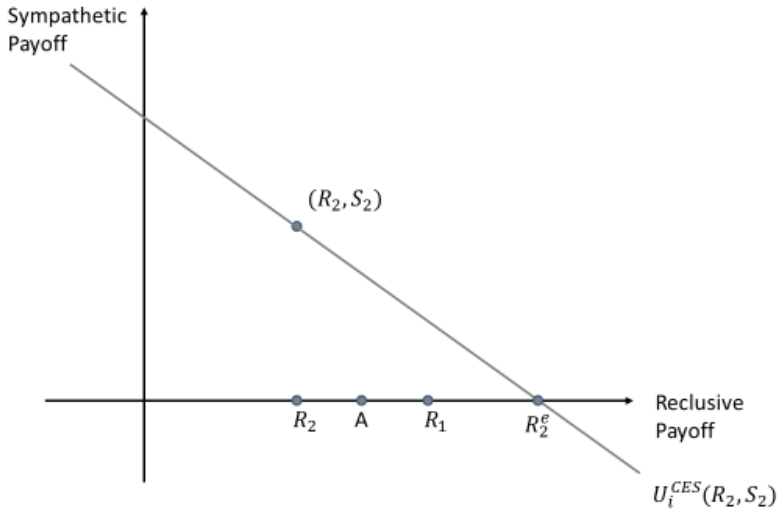


Fig. 3.3: Two Dimensional Willingness to Pay

In this instance, gamble 2 would be funded in preference to gamble 1 because of the agent's willingness to sacrifice real reclusive rewards in exchange for sympathetic goods. The CES utility function of agent *i* allows us to generate the gamble's reclusive equivalent (R^e) for the purpose of calculating the interest rate agent *i* would be willing to pay, γ_i.

Any gamble whose 2-dimensional payoff bundle lay on the same utility curve for a particular agent will generate the same reclusive equivalent, but it may/ be useful to differentiate between these types of gambles according to whether or not the reclusive payoff is positive. To that purpose, those gambles along U_i^{CES} with positive reclusive equivalents and positive reclusive payoffs will be referred to as "investments"; those with

positive reclusive equivalents and negative reclusive payoffs will be referred to as "projects", as in Fig. 4.

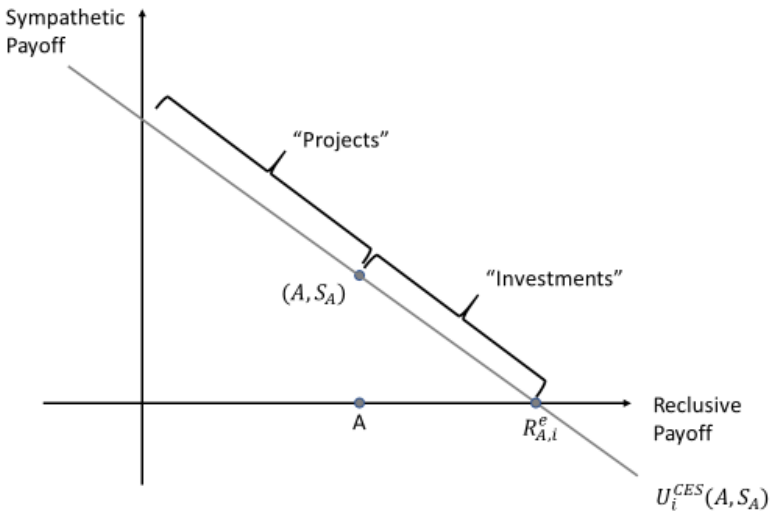


Fig. 3.4: Two Dimensional Projects and Investments

These designations will help identifying which agents seek loanable funds for financial gain – investors, or Adam Smith's "sober debtors" – and which agents seek loanable funds for sympathetic gain, or Adam Smith's "projectors".[200] Within the simulation we will only be able to identify projectors *ex post* by looking at which agents borrowed to fund projects, but, as shown in Fig. 5, as the substitution parameter approaches 0 the reclusive equivalent for any project's bundle approaches infinity. We can say, then, that the shape of the distribution of ρ among the population is going to greatly affect the

[200] The distinction between "projectors" and "sober debtors" in Adam Smith's economic analysis is addressed in Chapter 2: Projectors as Chimerical Men of System.

proportion of the population who become projectors, and therefore which gambles get funded and which do not.

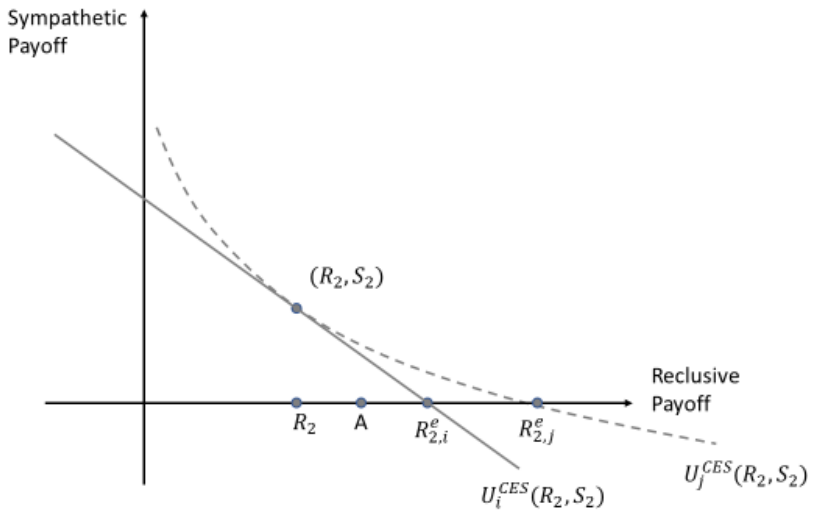


Fig. 3.5: Effect of ρ on Reclusive Equivalent Willingness to Pay

So far we have only mentioned agents who perceive potential gambles and decide to expend funds in their pursuit, but creditors deserve attention both for enabling the rationing of liquidity and for consistently applying the 2-dimensional payoff structure to all agents within the model. Fig. 5 begins this by looking at the decision-making of purely reclusive-oriented creditors.

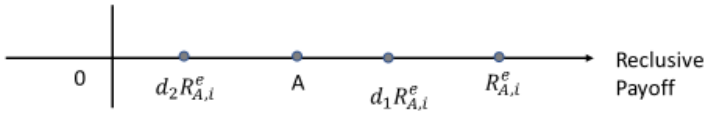


Fig. 3.6: One Dimensional Creditor Discounting

The debtor might offer $R^e_{A,i}$ in the future as repayment for borrowing *A* today, but creditors discount the promised payment as some proportion of debtors will default. Depending on how the creditors calculate likely default rates, a gamble might be financed (Bank 1: $d_1R^e_{A,i} > A$), or refused (Bank 2: $d_2R^e_{A,i} < A$).

By introducing sympathetic payoffs into the creditor's utility function, we can see how a creditor might be willing to fund a project. In Fig. 7 the creditor is indifferent between holding onto their loanable funds and all gambles along the CES utility function; those projects above the CES function would be preferable to all investments on the function, and preferable to retaining the loanable funds, subject to the creditor's budget constraint.[201]

[201] In Figures 4 and 7 the existence of investments with payoff bundles in Quadrant IV are interesting. This paper's model for sympathy includes only positive payoffs, but negative payoffs are easily conceived: the investor who opens sweatshops in Thailand and generates great financial reward may be reviled publicly. The effect negative sympathetic/positive reclusive rewards (anti-projects?) would have on credit rationing are worth exploring and will be addressed in the conclusions, but are beyond the scope of the current paper. UPDATE: Smith's concept of ignominy (negative sympathetic rewards) is based upon failure, not success. If succeed, you get positive rewards. Need to look further to see if success can also be met with negative sympathy (envy? repugnance?). UPDATE 2: if failure earns negative sympathetic returns, then it's possible a game of scapegoating goes on… which is exactly what happens in "Precipitation and Fall", the official report on what happened with the Ayr bank, where the blame was placed on the bank managers, and not on the politically-connected politicians and nobles who made the thing actually happen. Henry

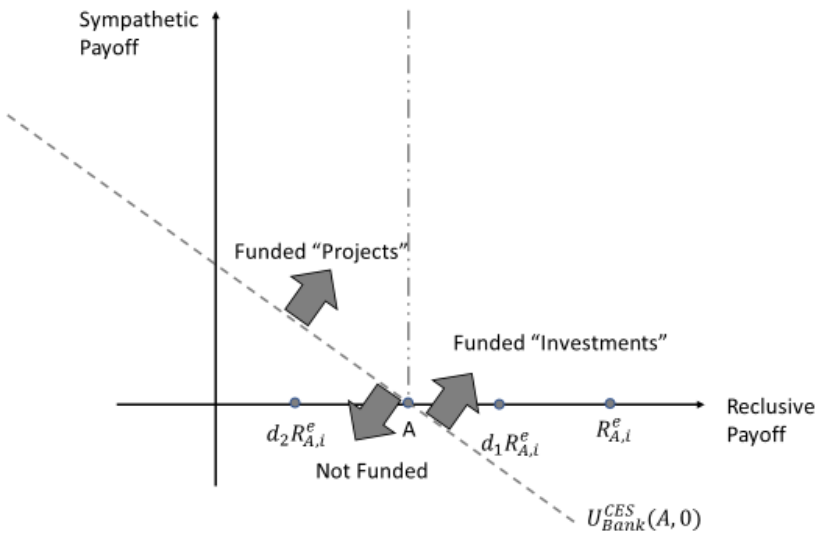


Fig. 3.7: Two Dimensional Credit Allocation

Price ceilings change credit rationing by interrupting debtors' ability to offer higher reclusive payments.[202] Those debtors whose willingness to pay is bound by the price ceiling will be able to offer only the ceiling (Ψ). It is this new offer the creditor will discount. Those gambles whose bound and discounted offers fall below the creditor's indifference curve (the CES utility function intersecting A) will be excluded from the credit market and remain unfunded. A symmetrical effect is shown in Fig. 3.8, where, instead of shifting a gamble's returns to the left, the creditor's indifference curve is shifted to the right.

Dundas was on the board of inquest for crying out loud, and he was the one convinced the Bank of Scotland to accept Ayr Bank bills at par. Also possibly tie in Levy&Peart "Prudence with Biased Experts"

[202] This interruption was imperfect in practice. Goodspeed (2016) discusses the practice of drawing bills for a larger quantity of capital than was actually lent. An actual loan of 95 with a stated loan of 100 would conform to the legal limit of 5% interest but have an actual interest of 10.5%.

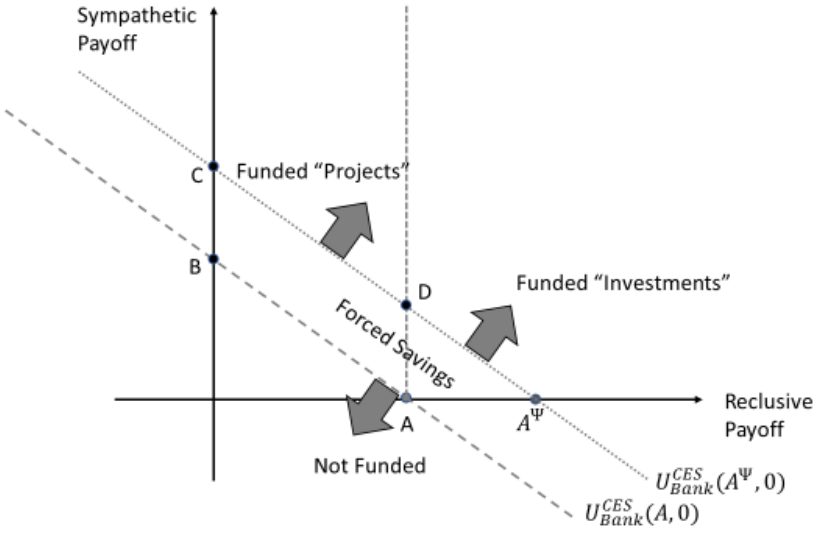


Fig. 3.8: Two Dimensional Constrained Credit Allocation

The area between the unbound indifference curve and the price ceiling influenced indifference curve represent those gambles not funded because of the price ceiling. The net effect of the price ceiling can be seen in the comparison between the area $ABCD$ and ADA^{Ψ}. So long as $ABCD > ADA^{\Psi}$, we can expect the total reclusive gains from gambling to be improved with the imposition of the price ceiling. As the price ceiling binds more and more gambles, however, geometry dictates[203] that eventually $ABCD = ADA^{\Psi}$, attaining the reclusive rewards maximizing price ceiling, Ψ*.

Furthermore, analysis so far has dealt with a single homogenous credit market. If, alternatively, credit markets are heterogenous and consist of a high-risk and low-risk

[203] Existence Proof: for any right triangle 0BA, increasing the height B by e and keeping the slope constant will produce equal areas for ABCD and ADA^{Ψ} when e=B.

market where the market price for loanable funds is respectively high and low, a price ceiling can be simultaneously binding and non-binding, as in Fig. 3.9.

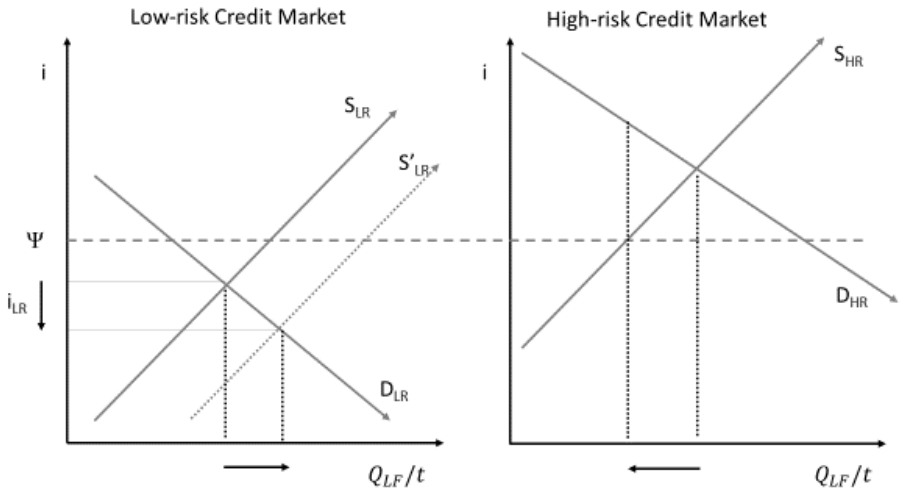


Fig. 3.9: Asymmetrically Binding Price Ceilings

Those creditors having forced savings imposed upon them in the high-risk market and, seeking a productive employment for their capital, entering the low-risk market would manifest as an increase in the supply of low-risk loanable funds, and consequently lowering the market rate, and expanding the quantity of low-risk gambles undertaken.

4.3 The Simulation

We first set the global parameters of monetary liquidity, M_j, the normally distributed standard deviation of the expected rate of return for all gambles, r_j[204], and the cultural sympathetic relevance, λ_j. These parameters represent the financial and social institutions within which agents operate. We next model individual potential debtors with their particular risk preferences (the base model assumes risk neutrality) and personal preferences for sympathetic payoffs. Each debtor perceives a potential gamble with a randomly generated required ante, A_h, expected rate of return, r_i, and a probability of success, p_i, which in combination generates a winning reclusive payoff R_i. $\frac{A_i(1+r_i)}{p_i} = R_i$. Sympathetic payoffs, S_i are generated proportional to R_i and inversely proportional to p_i. $S_i = R_i * (1 - p_i)$.[205] The greater the reclusive winnings, the greater the sympathetic reward which models the magnitude and visibility of projects such as the French highway discussed above; the lower the likelihood of success, the greater the sympathetic reward because others' surprise at the success . Because sympathetic rewards come from others,

[204] Gambles' expected returns are normally distributed among potential debtors, and the profile of gambles brought seeking financing is the positive portion of the normal distribution under the assumption that all agents are reclusive. However, because potential sympathetic rewards can induce debtors to seek financing for gambles with negative expected reclusive returns, the distribution of expected returns of gambles seeking funding is non-normal. Similarly, under assumptions of reclusion, the distribution of offered repayments is a transformation of the (positive) normal rate of return by the uniform variable distributions of the Ante and the probability of success. Assumptions of sympathetic preferences among debtors converts the distribution of offered repayments into a non-normal distribution as large sympathetic payoffs with small probabilities of success absent from the reclusive distribution add to the heavy tail in the sympathetic distribution.

[205] Smith deals with the effect of surprise in History of Astronomy, Section 1. Because observers do not imagine the unlikely to happen, their minds are not prepared to receive the news of success, with their joy at good tidings amplified. Applause for the near-certain venture would be far milder than the applause for the unlikely venture.

the expected sympathetic reward is unmodified further by qualities of the debtor, and generates risk-neutral expectations: $S_i * p_i = E_S(g_i)$.

One of the Smith's complaints about projectors willingness to take on risk[206]. We model debtors' risk-seeking behavior in two ways. Firstly, the uniformly distributed variable A_h (between 1 and 10) is divided by the fifth root of δ_i to produce A_i; this has the effect of making agents with δ_i closer to 0 encounter gambles with relatively larger antes, conforming to the tendency of projectors to seek funding for large scale grand designs.

Secondly, the expected reclusive payoff to the project (but not the sympathetic payoff), $R_i * p_i$, is modified before entering the CES utility function. The payoff is multiplied by a risk preference factor with two components: a factor uniformly distributed between [-.05, .05], and a factor of $\frac{\delta_i - .5}{25}$. The latter produces a range of values [-.02, .02] determined by δ_i. In combination this produces a range [-.07, .07]. This risk preference factor F_i is then combined with the risk neutral expected reclusive payoff: $R_i * p_i * [(1 - F_i) + (p_i * F_i)] = E_R(g_i)$. The consequence is for low-δ_i agents to be risk loving more often than not, and to more highly value low-p_i gambles; while high-δ_i agents to be risk averse more often than not, and to more highly value high-p_i gambles. Note that this does not change the actual reward of the project, R_i, nor the sympathetic rewards, S_i, merely the

[206] "Projectors as Chimerical Men of System" describes projectors' willingness to take on risk at least partially due to their unfamiliarity with the particular industry. This paper models that ignorance of risk as identical in effect to risk-seeking behavior.

perceived expected utility gains from risk preferences matching the risk profile of the gamble, $E_R(g_i)$.

The CES utility function for each debtor aggregates the (risk-preference adjusted) reclusive and sympathetic payoffs into expected utility in two-dimensional space.

$$(1) \quad U_i(g_i) = [\delta_i E_R(g_i)^{\rho_i} + (1-\delta_i)\lambda E_S(g_i)^{\rho_i}]^{\frac{1}{\rho_i}}$$

We then convert this two-dimensional utility expression into a reclusive equivalent using the agent's particular utility function.

$$(2) \quad U_i^{RE_{g_i}}(X_i) = [\delta_i {X_i}^{\rho_i} + (1-\delta_i)\lambda 0^{\rho_i}]^{\frac{1}{\rho_i}}$$

Equating equations (1) and (2) yields:

$$(3) \quad [\delta_i {X_i}^{\rho_i} + (1-\delta_i)\lambda 0^{\rho_i}]^{\frac{1}{\rho_i}} = [\delta_i E_R(g_i)^{\rho_i} + (1-\delta_i)\lambda E_S(g_i)^{\rho_i}]^{\frac{1}{\rho_i}}$$

Solving (3) for X_i yields:

$$(4) \quad X_i = [\frac{\delta_i E_R(g_i)^{\rho_i} + (1-\delta_i)\lambda E_S(g_i)^{\rho_i}}{\delta_i}]^{\frac{1}{\rho_i}}$$

$$(5) \quad X_i = [E_R(g_i)^{\rho_i} + \frac{(1-\delta_i)}{\delta_i}\lambda E_S(g_i)^{\rho_i}]^{\frac{1}{\rho_i}}$$

The debtor compares this reclusive equivalent to the required ante and decides to seek funding if the gamble is expected to render him a utility gain; for simplicity's sake we assume the debtor offers his willingness to pay, expressed as an interest rate he is willing to pay for the loan to finance the gamble.

$$(6) \quad \gamma_i = \frac{X_i}{A_{g_i}} - 1 = \frac{[E_R(g_i)^{\rho_i} + \frac{(1-\delta_i)}{\delta_i}\lambda E_S(g_i)^{\rho_i}]^{\frac{1}{\rho_i}}}{A_{g_i}} - 1$$

It is this interest rate, γ_i, that constitutes his willingness to pay for loans to finance the gamble, and, if positive, the rate the prospective debtor will have in mind as he seeks funding from creditors. The prospective debtor offers $X_i = A(1 + \gamma_i)$ as a promised repayment for the loan.

Creditor agents, each also possessing their own risk- and sympathy-preferences (the base model for creditors is risk neutral with zero preferences for sympathetic rewards), take into consideration the fundamentals of the gamble and the offers made by the debtors. Following Bentham's argument in response to Smith[207] that the risk-seeking behavior of debtors would be moderated, if not eliminated, by the risk-aversion of creditors, we bias the distribution of creditor risk preferences towards risk aversion. Each offer is discounted based upon the gamble's probability of success (less likely gambles being discounted more by risk averse creditors and less by risk seeking creditors, and *vice versa*) and upon the gamble's expected rate of return (the lower the expected rate of return, the more likely the debtor is to default on his loan) to produce a discounted expected reclusive payment. We use a linear combination of a base probability of failure, the expected rate of return, and the creditor's risk preference profile to generate the discount factor. The simplicity of the formula attains a resorting of gambles' expected returns based upon the underlying reclusive features of the gamble; in doing so it models

[207] Bentham, Defense of Usury, Letter XIII

creditors as willing to finance sympathetic rewards while not entirely forgetting about gambles' reclusive profile.

$$(7) \quad D_j = .9 + r_i + aversion_j(p_i - 1)$$

Aversion is uniformly distributed between [-.03, .07], producing the circumstances where 30% of the creditor population is risk-seeking, and 70% of the creditor population is risk-averse.

Sympathetic payoffs are not discounted as they will accrue to the creditor independently of debtor behavior. The discounted expected reclusive payment and sympathetic payoff are then aggregated in the creditor's CES utility function to produce a discounted reclusive equivalent payment.

$$(8) \quad U_j(g_i) = [\delta_j(D_j X_i)^{\rho_j} + (1 - \delta_j)\lambda E_S(g_i)^{\rho_j}]^{\frac{1}{\rho_j}}$$

$$(9) \quad U_j^{RE_{g_i}}(X_j) = [\delta_j {X_j}^{\rho_j} + (1 - \delta_j)\lambda 0^{\rho_j}]^{\frac{1}{\rho_j}}$$

Equating equations (8) and (9) yields:

$$(10) \quad [\delta_j {X_j}^{\rho_j} + (1 - \delta_j)\lambda 0^{\rho_j}]^{\frac{1}{\rho_j}} = [\delta_j(D_j X_i)^{\rho_j} + (1 - \delta_j)\lambda E_S(g_i)^{\rho_j}]^{\frac{1}{\rho_j}}$$

Solving equation (10) for X_j yields:

$$(11) \quad X_j = [\frac{\delta_j(D_j X_i)^{\rho_j} + (1-\delta_j)\lambda E_S(g_i)^{\rho_j}}{\delta_j}]^{\frac{1}{\rho_j}}$$

$$(12) \quad X_j = [(D_j X_i)^{\rho_j} + \frac{(1-\delta_j)}{\delta_j}\lambda E_S(g_i)^{\rho_j}]^{\frac{1}{\rho_j}}$$

This discounted reclusive equivalent payment is then compared to the gamble's ante to generate a reclusive equivalent rate of profit; if that rate is positive, the creditor considers funding the gamble.

$$(13)\ \gamma\psi_j = \frac{X_j}{A_{g_i}} - 1 = \frac{\left[(D_j X_i)^{\rho_j} + \frac{(1-\delta_j)}{\delta_j}\lambda E_S(g_i)^{\rho_j}\right]^{\frac{1}{\rho_j}}}{A_{g_i}} - 1$$

The variable is named γψ recognizing price ceilings, ψ, limit the bank's ability to accept payments upon imposition.

Gambles are then ranked by their reclusive equivalent rates of profit. Those gambles with the highest rates are funded first; those with the lowest are funded last. Creditors fund every gamble with a positive reclusive equivalent rate of profit subject to the budget constraint. A funded gamble is designated as having a $\alpha_i = 1$. If the total antes of all funded gambles do not employ total liquidity, the balance of liquidity is designated as savings, V_j^*. Creditors' objective function is thus:

$$(14)\ Max\{V_j^* + \sum_{i,j=0}^{n}[(\gamma\psi_j + 1) * A_{g_i}]\forall g_i\ s.t.\ \alpha_i = 1\}$$

Funded gambles are attempted by generating a random variable o; those gambles for which $o_i \leq p_i$ are successful, with the reclusive and sympathetic rewards accruing to the debtor and creditor agents. The reclusive payoffs to all gambles are aggregated and compared to the starting monetary liquidity, generating a growth rate for the economy:

$$(15)\ GR^*_{\lambda_k, M_k, r_k} = \frac{V_j^* + \sum_{i=0}^{n} R_i \forall g_i\ s.t.\ o_i \leq p_i, \alpha_i = 1}{M_k} - 1$$

Equation (15) provides the baseline unconstrained growth rate of the credit market.

We then test how imposing a price ceiling of ψ_m upon the credit market modeled above will affect the overall growth rate: $f_{GR}(\psi_m)$. The institutional parameters of monetary liquidity, standard deviation of rate of return distribution, and cultural sympathetic relevance remain constant, as do the elements of the gamble, as do the CES equations for both debtors and creditors. What changes is the ability of debtors to offer higher reclusive returns in exchange for sought-after sympathetic gains with the imposition of an interest rate price ceiling. Creditors do not simply discount an expected reclusive payment, but in the event the offered reclusive payment X_i represents an illicitly high interest rate on the loan relative to A_i, the creditor discounts for default and risk preferences the highest payment allowed by law, the price ceiling, Ψ_k. This discounting process is as Equation (8), except:

$$(16)\ U_j(g_i) = [\delta_j(D_j\{A_i * (1+\psi_m)\})^{\rho_j} + (1-\delta_j)\lambda E_S(g_i)^{\rho_j}]^{\frac{1}{\rho_j}}$$

$\forall g_i\ s.t.\gamma_i > \psi_m$

Equations 9-12 are repeated to include the imposition of the price ceiling. In those instances where willingness to pay rate γ_i is greater than the ceiling ψ_m, the legal maximum repayment of $A_i(1+\psi_m)$ is substituted for X_i. This produces a constrained credit market $\gamma\psi_j$ similar to Equation (13).

$$(17)\ \gamma\psi_j = \frac{X_j}{A_{g_i}} - 1 = \frac{\left[(D_j\theta_i)^{\rho_j} + \frac{(1-\delta_j)}{\delta_j}\lambda E_S(g_i)^{\rho_j}\right]^{\frac{1}{\rho_j}}}{A_{g_i}} - 1$$

$$\theta_i = [X_i\ , or\ A_i(1+\psi_m)\ if\ \gamma_i > \psi_m]$$

After discounting, gambles are again ranked by their reclusive equivalent rates of profit $\gamma\psi_j$, and funded subject to the budget constraint. Those gambles funded are designated with a $\alpha_{i,\psi_m} = 1$, as creditors again maximize their objective function as in Equation 14. Once the funded gambles have been identified, rewards are discovered, allocated, and aggregated. Again, this produces a growth rate for the constrained economy:

$$(18)\ GR_{\lambda_k,M_k,r_k,\psi_m} = \frac{V_{j,\psi_m} + \sum_{i=0}^{n} R_i \forall g_i \; s.t. \; o_i \leq p_i \; ; \; \alpha_{i,\psi_m} = 1}{M_k} - 1$$

The impact of the price ceiling ψ_m may be measured with the simple comparison:

$$(19)\ f_{\lambda_k,M_k,r_k}(\psi_m) = GR_{\lambda_k,M_k,r_k,\psi_m} - GR^*_{\lambda_k,M_k,r_k}$$

If $f(\psi_m) > 0$, the price ceiling constraint has increased the overall economic growth rate as compared to an unconstrained market. Conversely, if $f(\psi_m) < 0$, the price ceiling has diminished the overall economic growth rate.

The random elements of $f(\psi)$ such as each gamble's probability of success and the particulars of each agent's utility function make theoretical analysis of $f(\psi)$ difficult, so we applied a Monte Carlo method.

We began by assuming that all agents within the model were purely reclusive; that is, $\delta = 0$. We expected for this simulation to return the standard economic expectation of lower rates of growth as the price ceiling became binding. Each of the three global parameters of monetary liquidity M, the standard deviation of the distribution of rates of

return for gambles r, and the cultural sympathetic relevance λ were assigned relative values of "high", "medium", and "low". Within one of the 27 combinations of global parameter settings, 1M potential debtors evaluated a gamble, and offered their X_i to a similar number of creditors, who, after discounting, allocated funding according to their objective function; the growth rates of the unconstrained market and for 51 possible values of ψ (from 0% to 50% on the percents) were simulated and compared. This process was repeated ten times to generate a median set of growth rate differentials along the observed values of ψ. The same procedure was applied to the remaining 26 combinations of global parameter settings. The programming code for this procedure is available in Appendix 1.

Once the above was completed for the model where all agents were purely reclusive, we modeled a credit market where only the debtors were sympathy-seeking, and the creditors remained purely reclusive. Finally, we repeated the procedure for a credit market where both creditors and debtors were sympathy-seeking, and where debtors tended to be risk-seeking but creditors risk-averse.

4.4 Results

For the purposes of this model, "projectors" were those agents whose gambles had $r < 0$, $\gamma > 0$. In these cases, the risk-neutral expected financial returns were negative, but the

expected sympathetic payoff from a successful gamble was sufficient to bring that agent to market.

This simulation produced results where the constrained market outperformed the unconstrained market most of the time, given sympathetic preferences of debtors or debtors and creditors, although only for a specific range of values of ψ within each simulation. Figure 3.10 illustrates $f_{\lambda_{0.0001},M_{3mil},r_{.05}}(\psi_m)$. The dark grey dotted curve shows the effect of price ceilings assuming every agent is fully reclusive in their CES preferences; the grey dot-dash curve assumes debtors are sympathy-seeking, but creditors fully reclusive; the black dashed curve assumes all agents to substitute between sympathetic and reclusive payoffs.

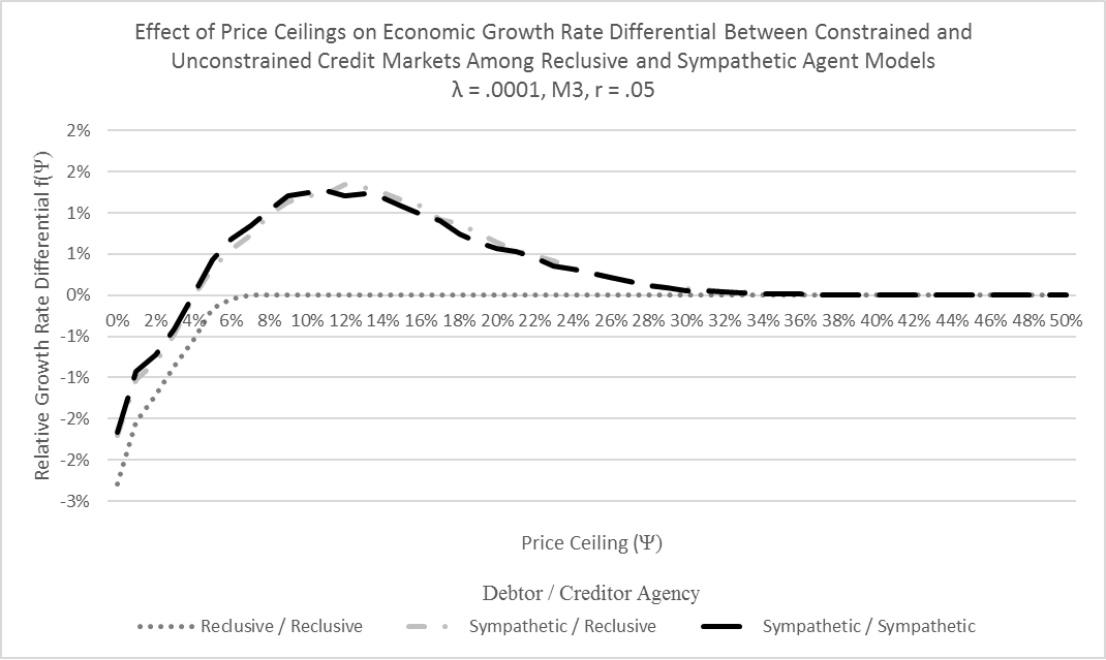


Fig. 3.10: Economic Growth of Constrained and Unconstrained Markets

The full results of the simulations are available in Appendix 2.

The presentation in Fig. 3.10 is representative of how differences in agency affect price ceiling performance. In every case where all agents are reclusive the application of price ceilings either had no effect (the price ceiling was non-binding), or reduced the overall growth rate; this result conforms to standard economic expectations. I every case involving sympathetic agents, as the price ceiling approaches the 0%-bound, the credit market experiences increasing growth rates until it reaches a maximum (at approximately 8%, but the maximum varies between models and parameters), at which point increases in growth are sharply curbed, if not entirely eliminated and made negative. Interestingly, there is relatively little difference of outcome between a market of sympathetic debtors and reclusive creditors, and a market with all sympathetic agents. The similarity between S/R and S/S markets is the pool of potential debtors, which suggests that the positive effects of the price ceiling presented above occurs in filtering the demand side of the credit market, not the supply side.

4.5 Analysis

The Reclusive/Reclusive models produced the expected standard outcomes: a price ceiling is either irrelevant, i.e. $f(\psi_m) = 0$, when it does not bind the market, or it his

harmful to economic growth, i.e. $f(\psi_m) < 0$. This result holds for all values of institutional parameters M, r, and λ, illustrated in Fig. 3.10 by the Reclusive/Reclusive curve. As all agents are fully reclusive, changes in λ produce no changes in behavior. The greater r, the higher the value of ψ_m at which $f(\psi_m)$ becomes negative; this is explained by the price ceiling rationing credit away from highly profitable but less likely gambles. The greater M, the less impactful binding price ceilings are on overall growth rates, as in tight liquidity markets a greater proportion of loans are financing high-return gambles, and elimination of gambles at the margin will have a greater overall effect.

Interestingly, the impact of creditor sympathetic preferences is not remarkable compared to the impact of debtor sympathetic preferences. The positive range of $f(\psi_m)$ seems driven entirely by debtor's willingness to seek funding for projects, and for the price ceiling's ability to condition creditors into rationing funding away from projects. This effect is demonstrated in Fig. 3.11 among the orange and grey curves and is consistent over all simulations witnessed. For simplicity's sake subsequent analysis will focus on the impact global parameters have on $f(\psi_m)$ given all agents are sympathetic.

At low levels of liquidity, $f(\psi_m)$ is tightly clustered depending upon *r*, as demonstrated in Fig. 3.11. All values of ψ_m yield positive $f(\psi_m)$, though $f(\psi_m)$ retains its general shape of increasing sharply near 0, peaking, then gently declining as ψ_m increases. Changes in λ have no discernable effect.

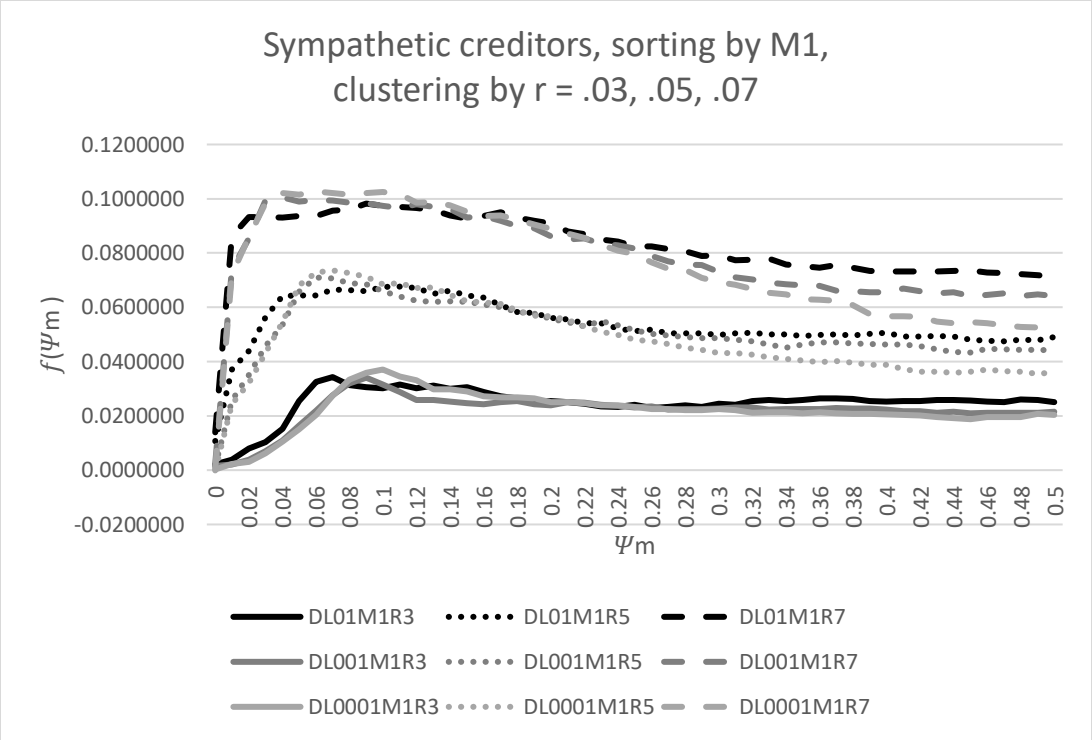


Fig. 3.11: Econoimc Growth with Sympathetic Creditors and M1

It is perhaps useful to frame this simulation in terms of thinking why an unconstrained market would perform poorly, rather than a constrained market perform well. Given that projectors are not excluded from an unconstrained market, they are able to effectively bid for funding. The small amount of liquidity available flows towards those debtors with the highest willingness to pay, among which will be a greater proportion of projectors. The application of any price ceiling, even so high as 50%, will exclude projects on the margin, and enable relatively high return inframarginal investments access to funding. The tight clustering of similar *r* values demonstrates the influence the earnings of inframarginal investments has upon growth rates, and its dominance over λ.

Cultural sympathetic relevance begins to exert an influence over $f(\psi_m)$ as the liquidity constraint is eased, as shown in Fig. 3.12. While $f(\psi_m)$ continues to order along lines of *r*, within those groupings λ has a consistent effect: societies with a higher cultural weight of sympathetic goods produce higher growth rates of reclusive goods in the face of interest rate price controls. This result was so surprising to us it bears restatement: the pursuit of sympathetic goods encourages reclusive good production. What is the explanation for this phenomenon? Consider the extramarginal investment: creditors have sufficient liquidity to fund the investment but decline to do so because of their discounting for default risk and their own risk aversion. Creditors prefer to earn 0% over the period rather than risk loss or non-payment. If both parties were reclusive the story would end here, and the investment remain unfunded. But agents' preferences for sympathetic goods raise both the debtor's willingness to pay and a higher creditor's discounted reclusive equivalent payment – but not raise them so high as to run afoul of the price ceiling. This is describing an investment with a modest reclusive return and modest sympathetic gain, possibly conforming to Adam Smith's description of a "sober debtor"[208] he prefers to prodigals and projectors. Perhaps this is also what is animating Bank of America's advertising focus on small local investments given the decade-long growth in the money supply post-2009.[209]

[208] Smith, WN II.ii.77

[209] Bank of America "Brian Moynihan: Listening to what matters most (Commercial)" https://youtu.be/PcYtVtylCBE

The final remarkable change is in the magnitude of the increase in growth price controls offer as liquidity expands: while the best-performing $f(\psi_m)$ in Fig. 3.11 could boast reclusive growth rates 10 percentage points higher than the unconstrained market at its optimum, and even the worst-performing had optimum rates 4 percentage points higher, the improvement of the unconstrained market with the expansion of liquidity reduces the potential increase in growth with the application of price controls: Fig. 3.12's best performing $f(\psi_m)$ optimum is only 7 percentage points higher, and the worst performing optimum not even 2 percentage points. This suggests the expansion of liquidity by deepening the credit market depresses the potential gains from price ceilings, and perhaps eliminates them altogether.[210]

[210] Although perhaps not. Gambles in this simulation are generated exogenously, while it's a perfectly reasonable claim that projects are endogenous to the market they're created in: Henry Dundas' late 18th century bridge to New Town in Edinburgh was a fantastic extravagance, but on an order of magnitude entire different from Elon Musk's modern desire to colonize Mars. If projects' magnitude are endogenous to the thickness of financial markets, it's possible price ceilings' beneficial credit rationing effects would be maintained.

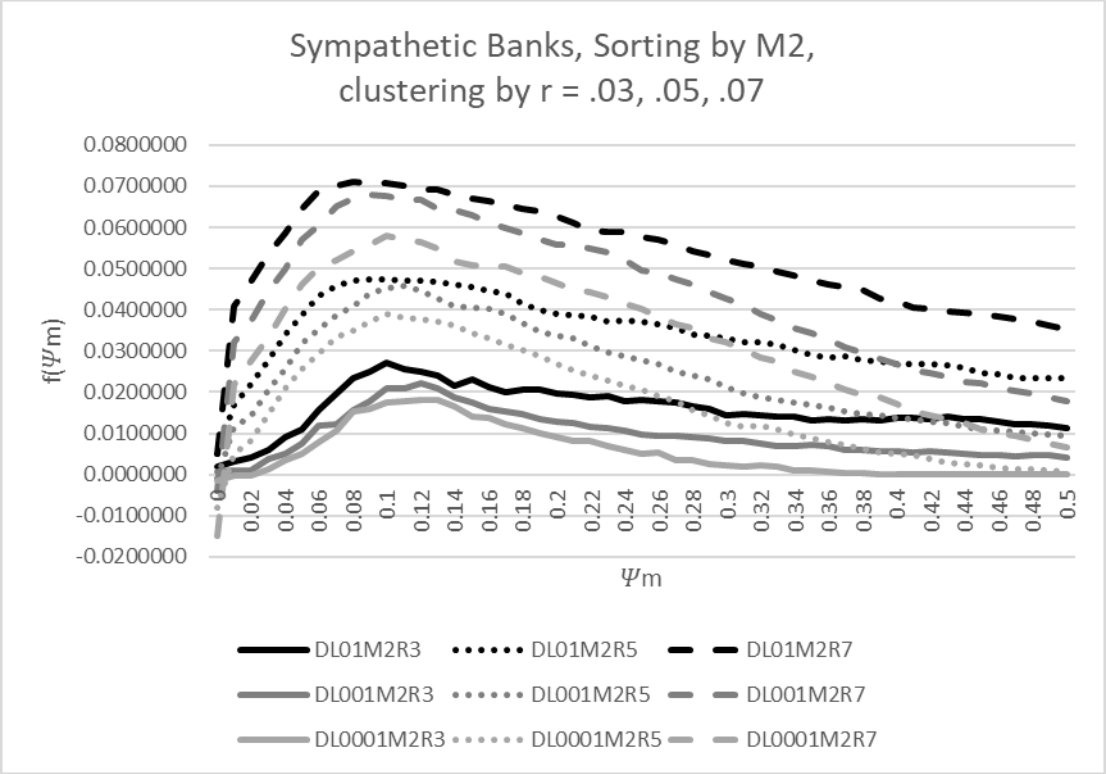


Fig. 3.12: Economic Growth with Sympathetic Creditors and M2

Besides the surprising result of sympathetic preferences generating reclusive production, $f(\psi_m)$ becomes negative at $\psi_m = 0$, and remains negative for very small positive values of ψ_m. This may be attributed to the improved performance of the unconstrained market: with greater liquidity, unconstrained creditors are able to finance a greater quantity of investments whose gains make up for the losses generated by the financing of projects, while constrained markets are excluding all gambles, both projects and investments.

Further expansion of monetary liquidity in Fig. 3.13 continues these three trends: *r* has less of an influence on the clustering of $f(\psi_m)$, to the extent curves with different values

of *r* overlap each other at low values of ψ_m; λ has a greater influence on driving $f(\psi_m)$ magnitudes and differentials; values of ψ_m further from the origin are generating negative values of $f(\psi_m)$; the potential gains from imposing a price ceiling on sympathetic markets shrinks further: the best performing $f(\psi_m)$ optimum offers a 4 percentage point improvement (which was the worst optimum's improvement in Fig. 3.11), while the worst performing optimum offers only .75 of a percentage point.

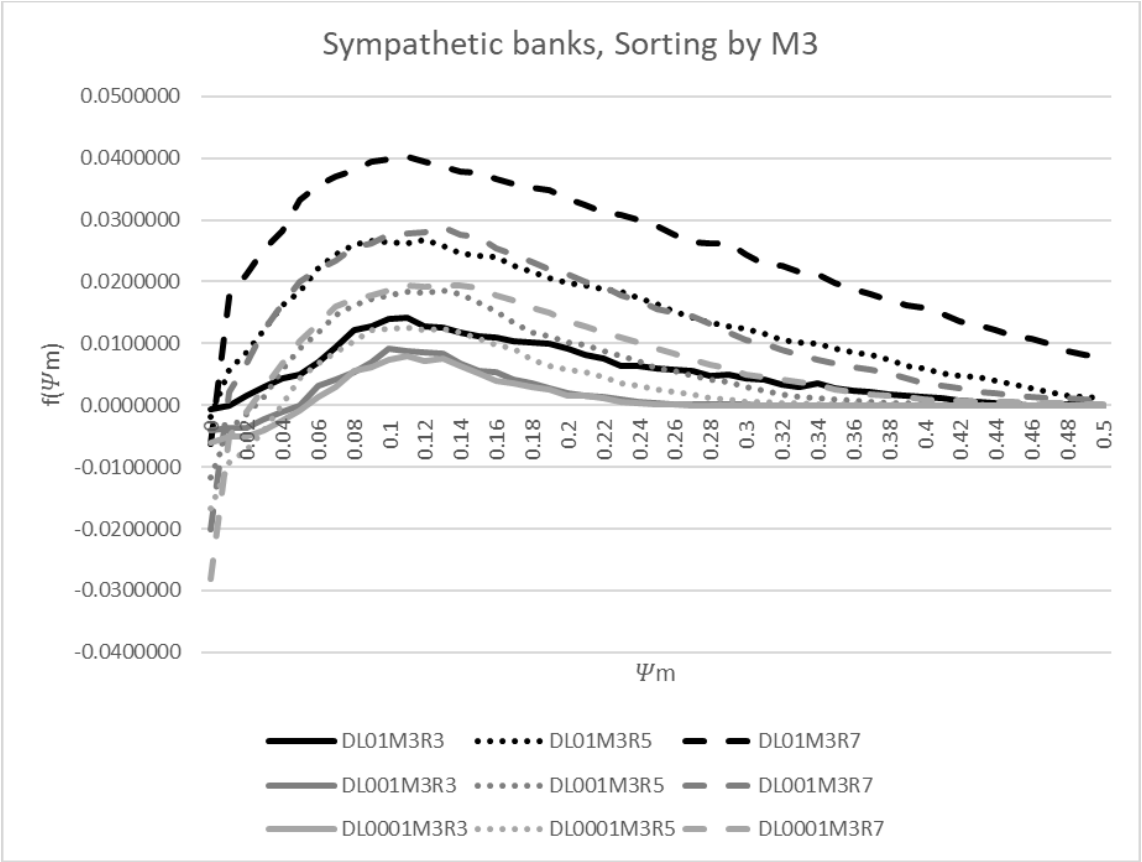


Fig. 3.13: Economic Growth with Sympathetic Creditors and M3

4.6 Conclusion

In this simulation we constructed a model of agents' preferences that included two dimensions: reclusive goods which persist from period to period, and sympathetic goods which are positional and possess qualities of rent seeking, but which also offer a potential source of increasing returns to scale. Agents sought to finance gambles at least partially because of the potential sympathetic rewards from a successful gamble, sometimes despite expectations that a gamble possessed negative reclusive rewards. When compared to the performance of a market unconstrained by price controls, constrained markets with sympathetic agents did possess improved reclusive economic growth over a range of price ceilings. The most efficacious price ceilings were close, but not too close, to the origin, and the lowest market rate accepted by a creditor to fund a debtor's gamble. We believe the model of sympathetic rewards is faithful to that described by Adam Smith in Wealth of Nations and Theory of Moral Sentiments, and offers theoretical support for his claim that a generally non-binding interest rate price ceiling is prudent in the sense of being less destructive, as a generally binding ceiling would be, but also prudent in the sense that imposing such a price ceiling is more desirable to having no price ceiling whatsoever.

These simulations suggest avenues for future development. The stability of these results across the various simulations is a consequence of the relationship between the number of potential debtors and the magnitude of individual projects relative to total liquidity. We can force variance on the model by reducing the quantity of debtors and liquidity

proportionally, but maintaining the size of the gambles' buy-ins. We shouldn't expect much to change here in the long run, but if individual projectors represent a greater proportion of the invested capital the potential benefits of rationing capital away from these projectors should be larger. A multi-period model might be useful to track economic growth over time, but it would need to address several theoretical questions, particularly whether individuals' sympathetic preferences are constant over time or endogenous to the institutional environment; its not clear this credit rationing scheme would produce an evolutionary environment that selected for prudential non-sympathetic preferences. Some attention was paid to the possibility that sympathy-seekers could be competing for political favor; the assumptions of this model may be applied to the historical use of public funds to rescue failing ventures by the politically connected.

5. Conclusion

This work has argued that the past 230 years of economic analysis has misidentified the problem posed by projectors as understood by Adam Smith. His understanding of human relations, including as it did the possibility of increasing returns to scale offered by sympathetic exchanges, and his proximity to the principal agents involved in the failure of the Ayr Bank permitted him to see potential weaknesses in completely self-regulated financial networks. These weaknesses were affirmed by 2000 years of commentary on moral failings and fraud. The traditional solution of legal limits on interest rates, under the assumptions of Smithian sympathy, was demonstrated to have theoretical benefits for long-term economic growth. Though the work of 230 years is not lightly thrown aside, its robustness to commercial activity guided by sympaethic factors in addition to financial gain ought to be examined.

Appendix

Appendix 1

Tables containing the references in Mizuta's Adam Smith's Library to the authors referenced in this paper.

Table 1: Ancient References

Author	Mizuta Entry
Appuleius, Lucius	68
Caesar, Gaius Julius	276-278
Cicero, Marcus Tillius	362-367
Flaccus, C. Valerius	1704
Hirtius, Aulus	276
Horace	811-823
Livy	1010-1011
Nepos, Cornelius	1202
Ovid	1237
Plautus, T. Maccius	1325
Pliny the Elder	1328
Pliny the Younger	1329-1331
Rufus, Q. Curtius	450
Sallust	1474-1476
Sisenna, L. Cornelius in Macrobius, A.A. Theodosius	1082
Seutonius	1619
Statius, P. Papinus	1589
Tacitus, C. Cornelius	1628
Varro, M. Terentius	678
Virgil	1729-1737

Table 2: Contemporary References

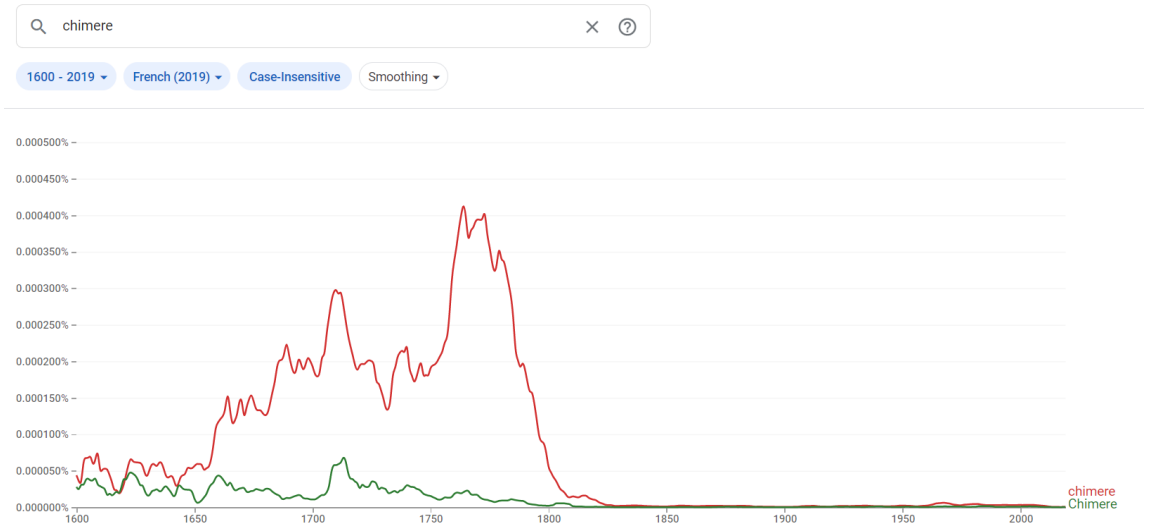
Author	Mizuta Entry
Bentham, Jeremy	148-149
Bible	159-160
Burke, Edmund	239-250
Cooper, Anthony, Earl of Shaftesbury	1512
Defoe, Daniel	488-489
Diderot, Denis	500-503
Ferguson, Adam	604-607
Girard, Gabriel, abbé	685-687
Millar, John	1156
Milton, John	1160-1161
Newton, Isaac	1205-1209
Johnson, Samuel	878-882, 1296
Swift, Jonathan	1623-1624

Appendix 2

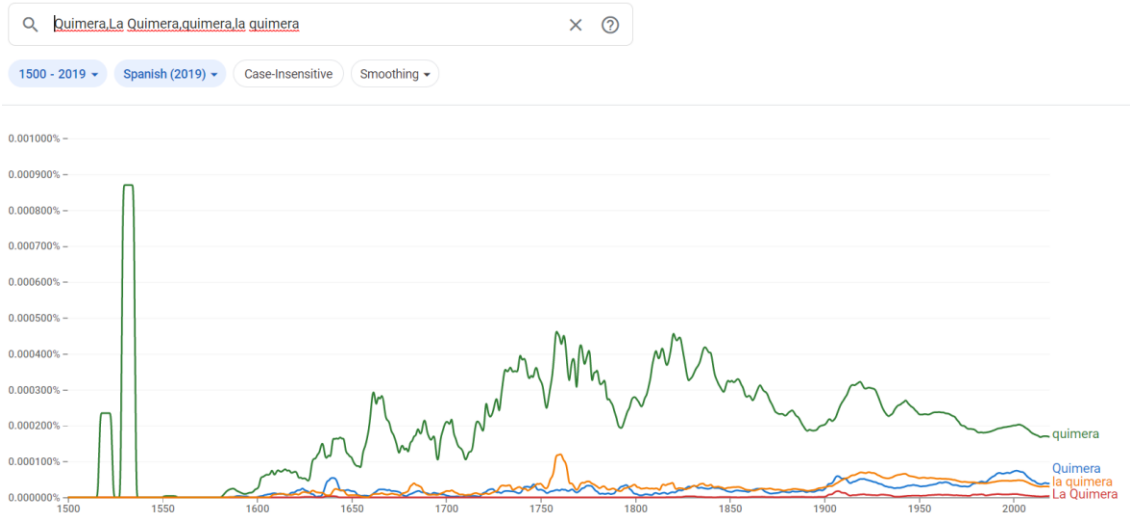
Ngrams of Chimera in Various Languages

English:

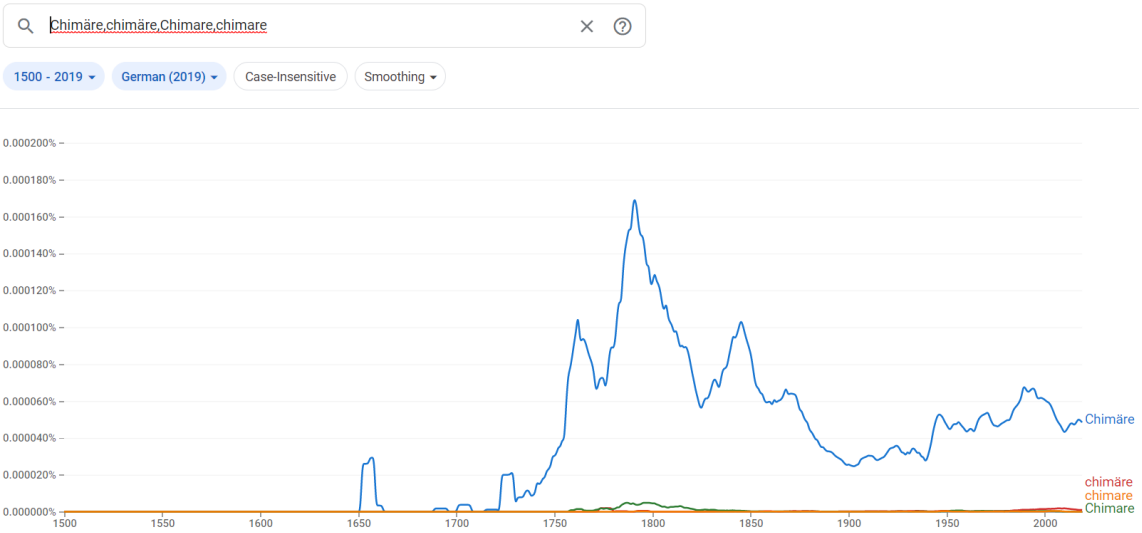
French:



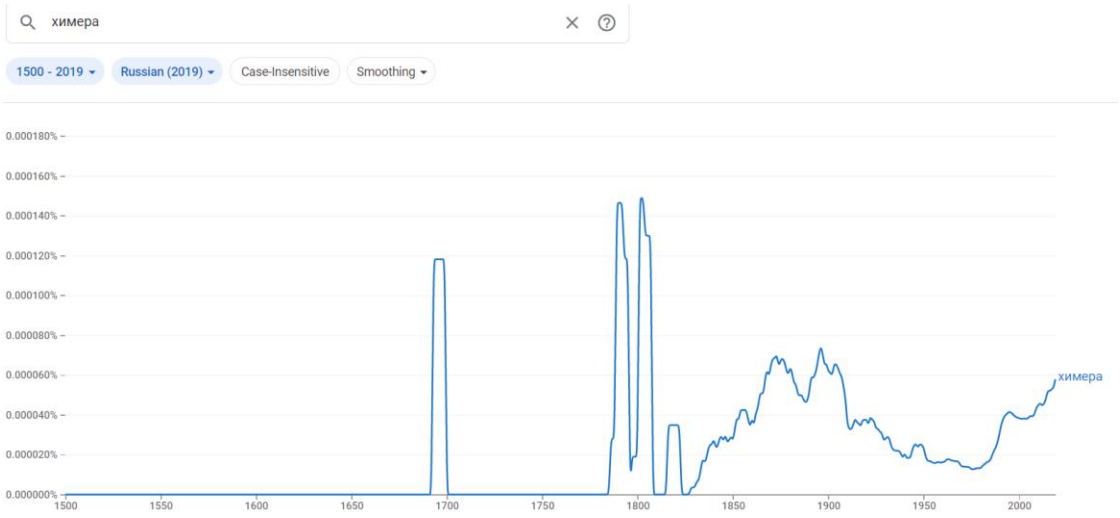
Spanish:



German:



Russian:


химера
1500 - 2019
Russian (2019)
Case-Insensitive
Smoothing
0.000180%
0.000160%
0.000140%
0.000120%
0.000100%
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1500
1550
1600
1650
1700
1750
1800
1850
1900
1950
2000
химера

Appendix 3

Effect of Price Ceilings on Economic Growth Rate Differential Between Constrained and Unconstrained Credit Markets Among Reclusive and Sympathetic Agent Models

The graphs below present all simulations within a designated cultural sympathetic relevance (λ) and monetary liquidity (M).

The basis for comparison, $f(\Psi) = 0\%$, does not represent a 0% rate of growth within the model, but the rate of growth of the simulation run under the same parameters without the application of a price ceiling. Thus, a data point of $(\Psi = 5\%, f(\Psi) = 2\%)$ would read "*a credit market constrained by a price ceiling of 5% would result in a median growth rate increase of 2% over an unconstrained credit market*".

Agency denominated RR are those models where all agents are reclusive and are shaded dark grey; SR are those models where debtors are sympathetic and creditors are reclusive, and are shaded light grey; SS are those models where all agents are sympathetic, and are shaded black.

The distribution of the expected returns of gambles (r) is presented in the dashing of the curves: distributions of r = .03 are displayed as dotted lines; distributions of r = .05 are displayed as dash-dot lines; distributions of r = .07 are displayed as dashed lines.

Chart 1
λ = .01, M1

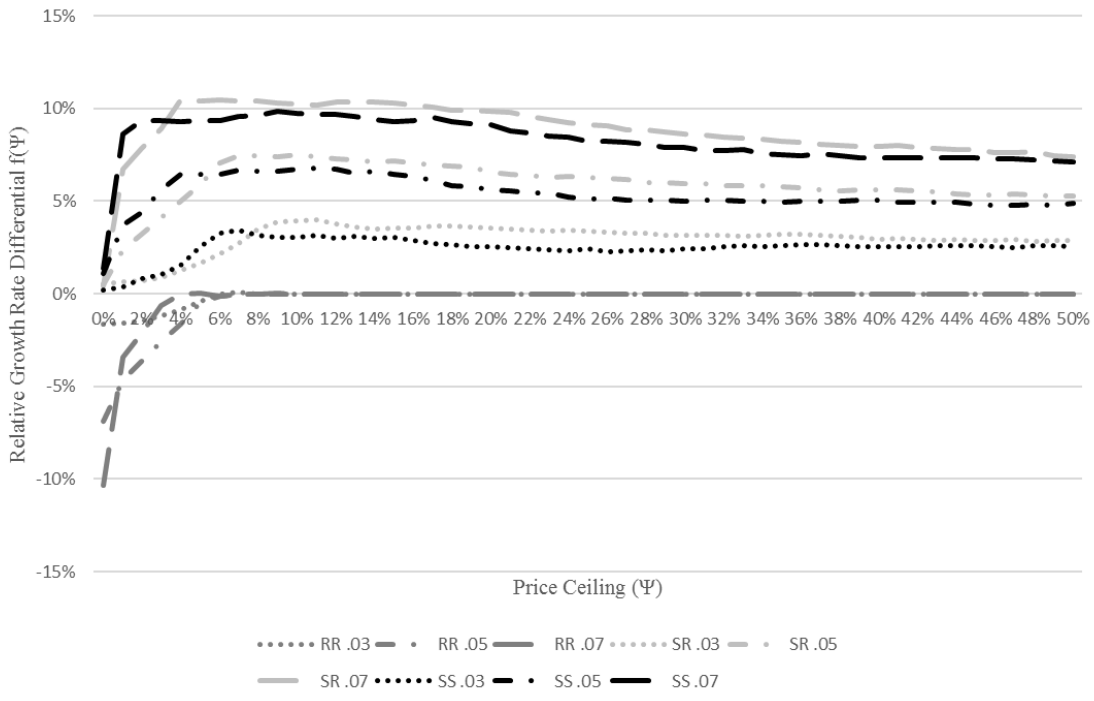


Chart 2
λ = .001, M2

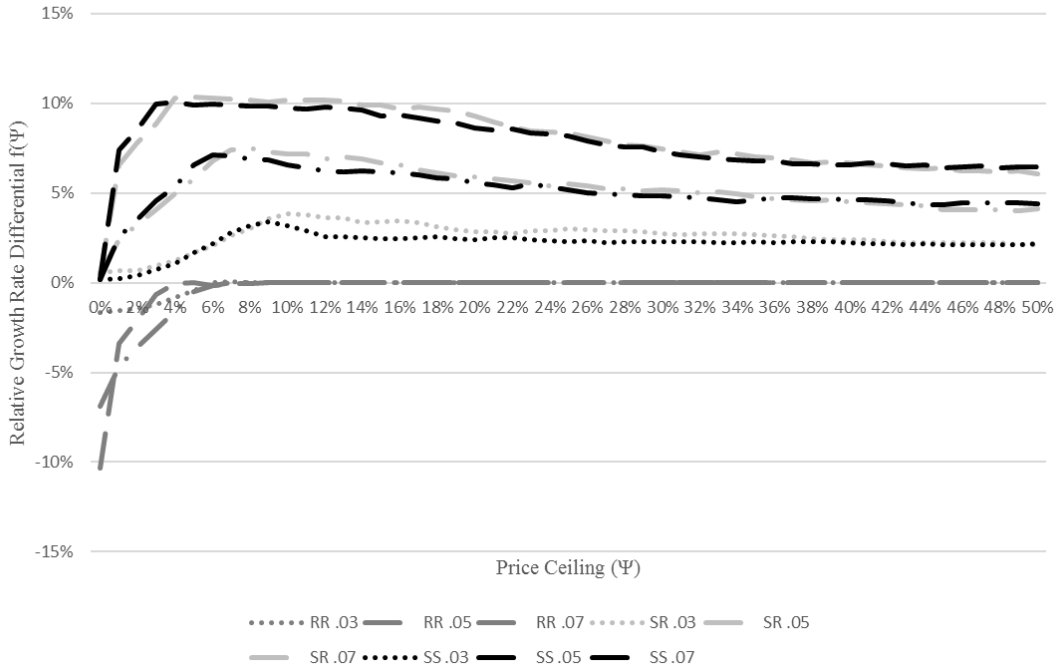


Chart 3
λ = .0001, M1

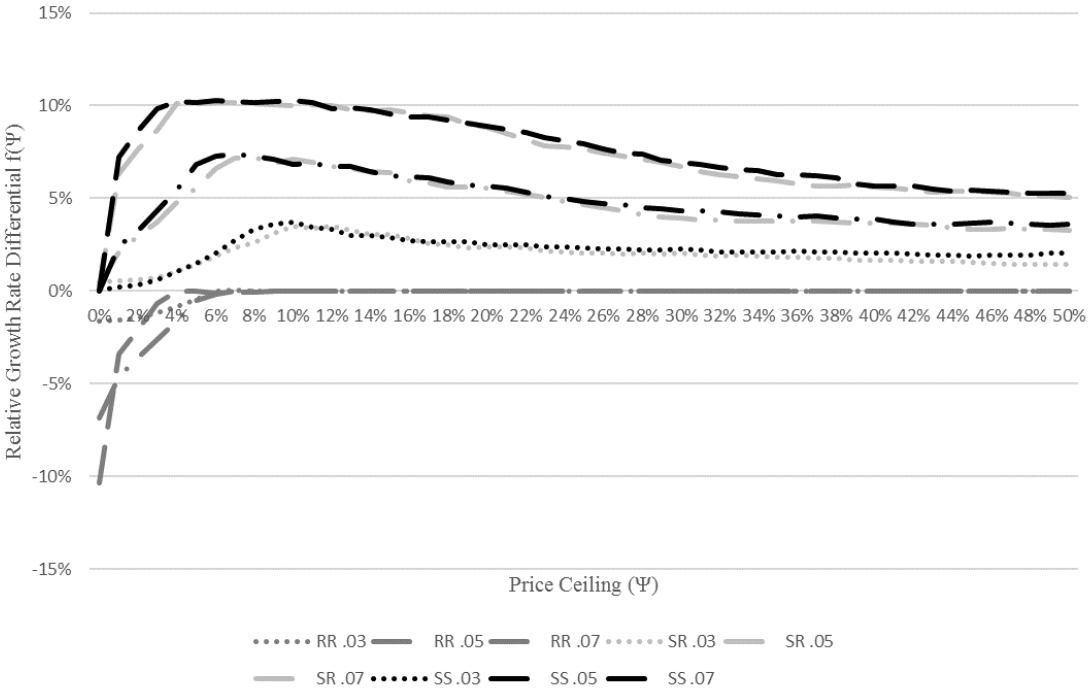


Chart 4
λ = .01, M2

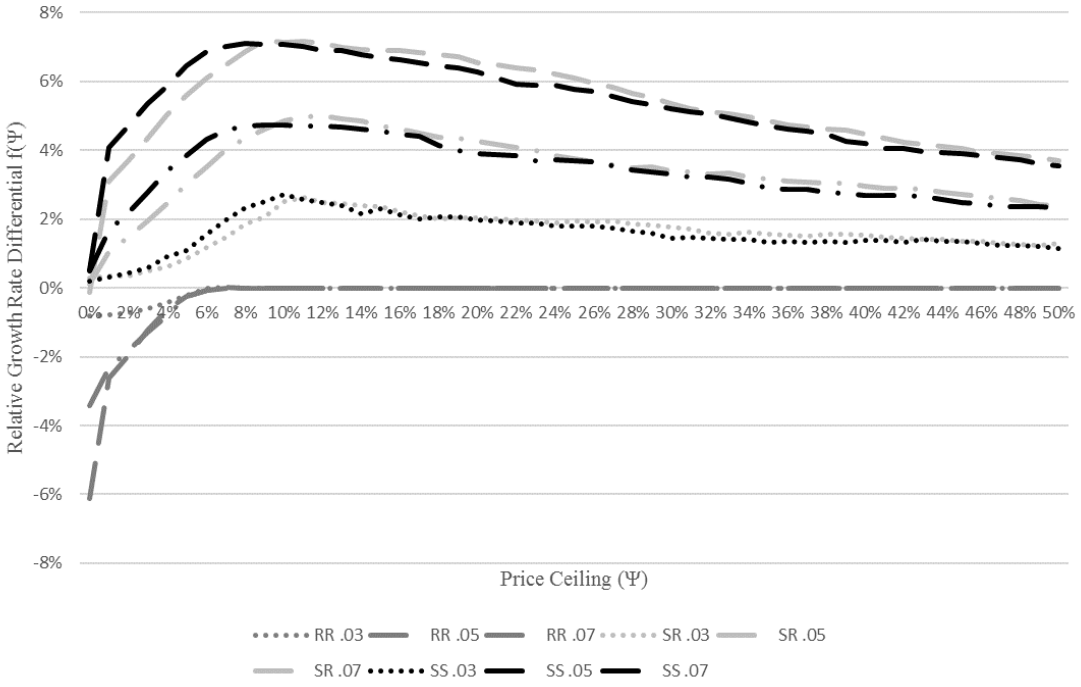


Chart 5
λ = .001, M2

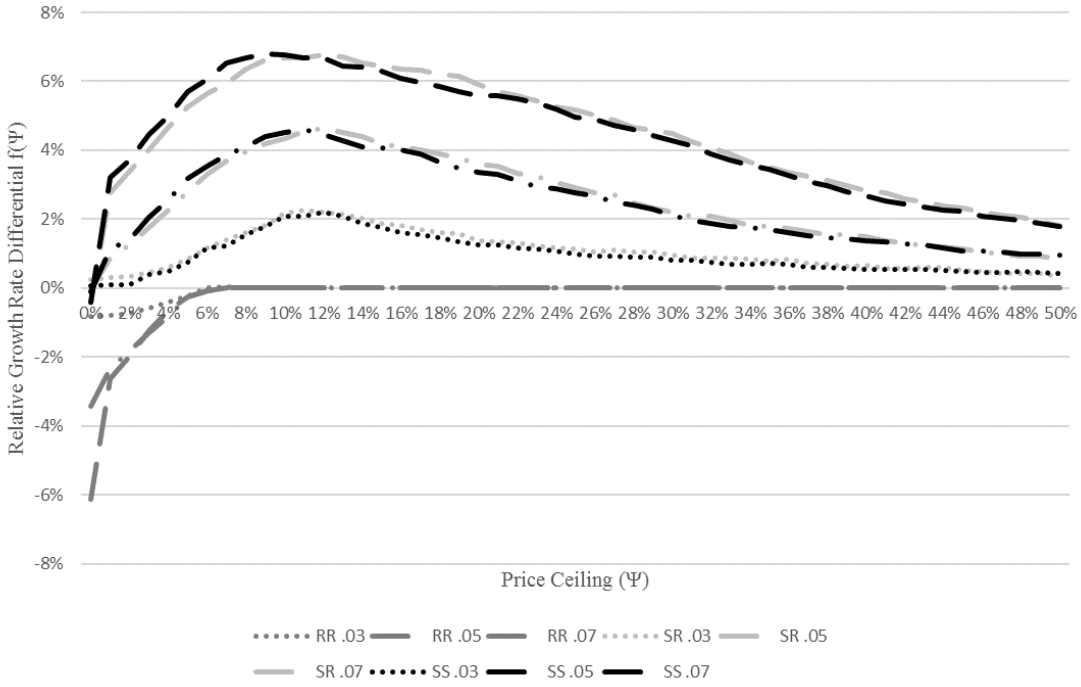


Chart 6
λ = .0001, M2

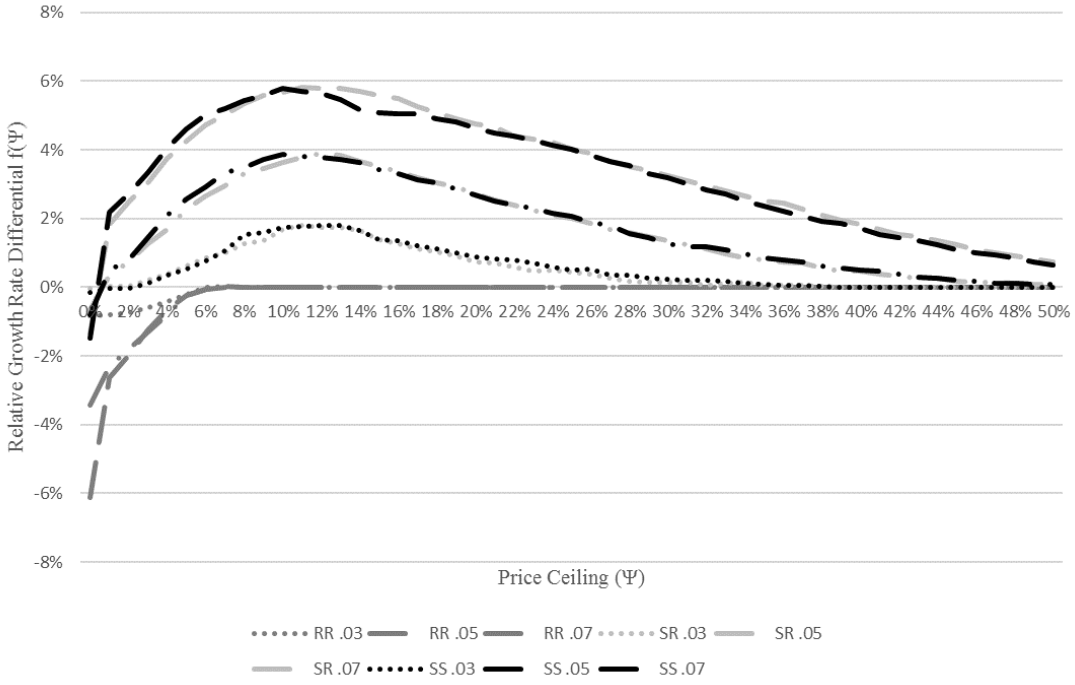


Chart 7
λ = .01, M3

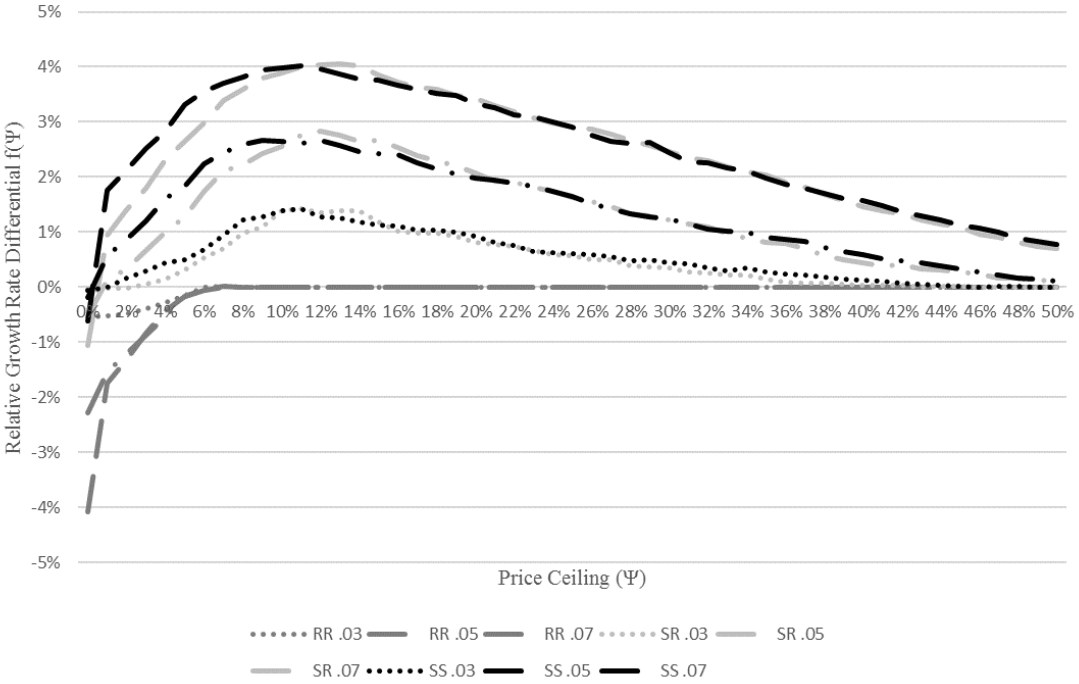


Chart 8
λ = .001, M3

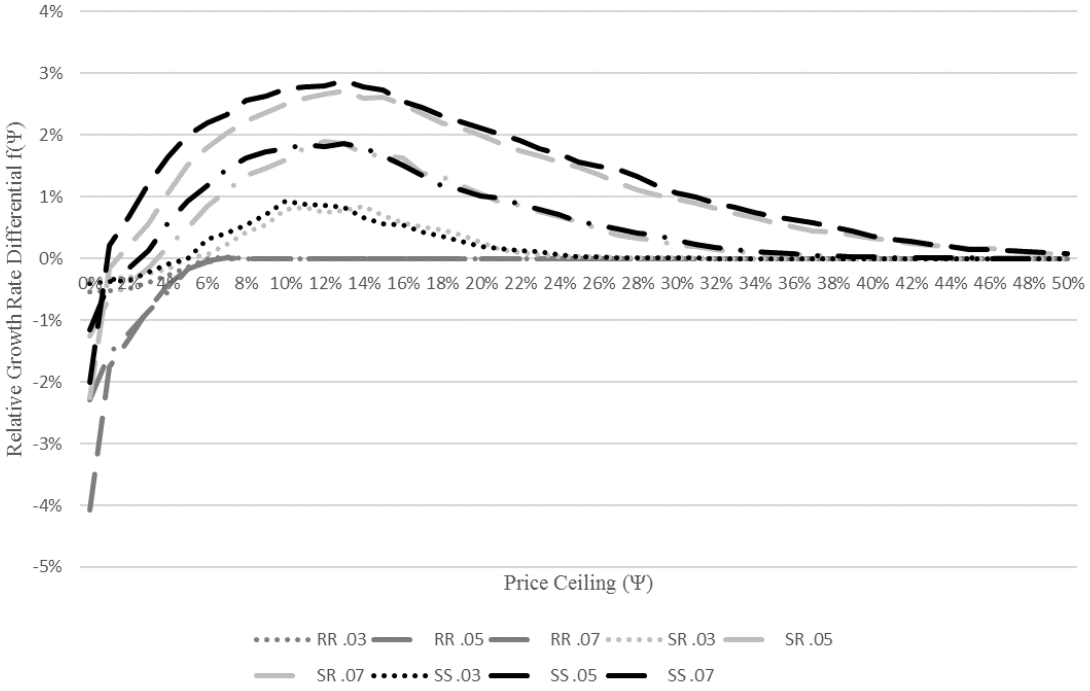
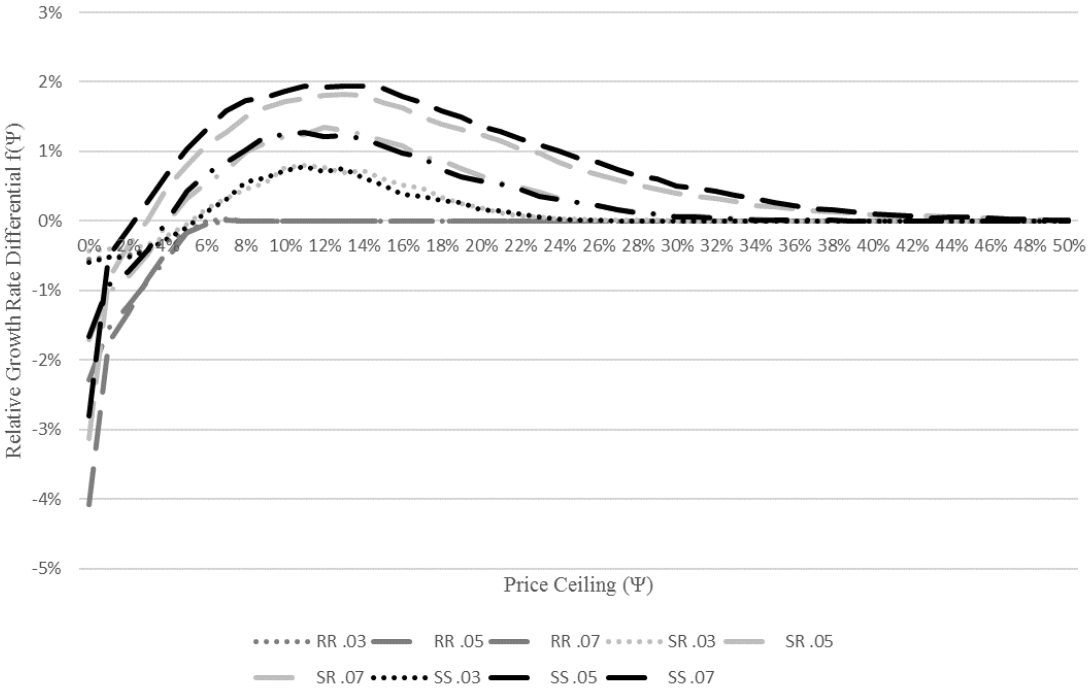


Chart 9
λ = .0001, M3



Appendix 4

Simulation Tables

The entries in each cell represent the median difference in growth between the credit markets with the corresponding price ceiling and the unconstrained market. Positive values indicate the constrained market had a higher growth rate under those conditions, negative values indicate the unconstrained market had a higher growth rate.

All unlisted values generated no measured difference at the median between the constrained and unconstrained markets.

Table 1: Reclusive Debtors, Reclusive Creditors, Low Liquidity (M1)

	M1								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	-0.01641	-0.01641	-0.01641	-0.06868	-0.06868	-0.06868	-0.10347	-0.10347	-0.10347
0.01	-0.01576	-0.01576	-0.01576	-0.04639	-0.04639	-0.04639	-0.03398	-0.03398	-0.03398
0.02	-0.01459	-0.01459	-0.01459	-0.03633	-0.03633	-0.03633	-0.02128	-0.02128	-0.02128
0.03	-0.01193	-0.01193	-0.01193	-0.02595	-0.02595	-0.02595	-0.00655	-0.00655	-0.00655
0.04	-0.00836	-0.00836	-0.00836	-0.01624	-0.01624	-0.01624	-0.00035	-0.00035	-0.00035
0.05	-0.00437	-0.00437	-0.00437	-0.00497	-0.00497	-0.00497	4.13E-05	4.13E-05	4.13E-05
0.06	-3.6E-05	-3.6E-05	-3.6E-05	-0.00155	-0.00155	-0.00155	-0.00147	-0.00147	-0.00147
0.07	0.000624	0.000624	0.000624	-6.3E-05	-6.3E-05	-6.3E-05	-0.00039	-0.00039	-0.00039
0.08	1.11E-16	-1.1E-15	1.11E-16	-1.1E-16	-2.2E-16	-2.2E-16	-0.00038	-0.00038	-0.00038
0.09	0	-7.8E-16	0	1.55E-15	9.99E-16	9.99E-16	0.00011	0.00011	0.00011
0.1	0	-3.3E-16	0	-4.4E-16	-1.1E-16	-1.1E-16	1.55E-15	-2.4E-15	-2.4E-15
0.11	0	-1.1E-16	0	-2.2E-16	-1.1E-16	-1.1E-16	3.33E-16	-5.6E-16	-5.6E-16
0.12	0	-2.2E-16	0	-1.1E-16	-2.2E-16	-2.2E-16	-5.6E-16	-3.3E-16	-3.3E-16
0.13	0	1.11E-16	0	0	0	0	5.55E-16	5.55E-16	5.55E-16
0.14	0	-3.3E-16	0	0	0	0	0	-7.8E-16	-7.8E-16
0.15	0	0	0	0	0	0	0	-3.3E-16	-3.3E-16
0.16	0	0	0	0	0	0	0	0	0

Table 2: Reclusive Debtors, Reclusive Creditors, Medium Liquidity (M2)

	M2								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	-0.0082	-0.0082	-0.0082	-0.03434	-0.03434	-0.03434	-0.06117	-0.06117	-0.06117
0.01	-0.00788	-0.00788	-0.00788	-0.0232	-0.0232	-0.0232	-0.0263	-0.0263	-0.0263
0.02	-0.00729	-0.00729	-0.00729	-0.01817	-0.01817	-0.01817	-0.0197	-0.0197	-0.0197
0.03	-0.00596	-0.00596	-0.00596	-0.01298	-0.01298	-0.01298	-0.01242	-0.01242	-0.01242
0.04	-0.00418	-0.00418	-0.00418	-0.00812	-0.00812	-0.00812	-0.00647	-0.00647	-0.00647
0.05	-0.00218	-0.00218	-0.00218	-0.00249	-0.00249	-0.00249	-0.00255	-0.00255	-0.00255
0.06	-1.8E-05	-1.8E-05	-1.8E-05	-0.00078	-0.00078	-0.00078	-0.00066	-0.00066	-0.00066
0.07	0.000312	0.000312	0.000312	-3.2E-05	-3.2E-05	-3.2E-05	0.000148	0.000148	0.000148
0.08	0	0	0	2.22E-16	0	0	-3.3E-15	1.11E-16	1.11E-16
0.09	0	0	0	6.66E-16	6.66E-16	6.66E-16	-1.4E-15	-1.8E-15	-1.8E-15
0.1	0	0	0	0	-1.1E-16	-1.1E-16	8.88E-16	9.99E-16	9.99E-16
0.11	0	0	0	0	-2.2E-16	-2.2E-16	4.44E-16	-2.2E-16	-2.2E-16
0.12	0	0	0	0	0	0	-3.3E-16	-4.4E-16	-4.4E-16
0.13	0	0	0	0	0	0	3.33E-16	2.22E-16	2.22E-16
0.14	0	0	0	0	0	0	0	-2.2E-16	-2.2E-16
0.15	0	0	0	0	0	0	0	0	0
0.16	0	0	0	0	0	0	0	0	0

Table 3: Reclusive Debtors, Reclusive Creditors, High Liquidity (M3)

	M3								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	-0.00547	-0.00547	-0.00547	-0.02289	-0.02289	-0.02289	-0.04078	-0.04078	-0.04078
0.01	-0.00525	-0.00525	-0.00525	-0.01546	-0.01546	-0.01546	-0.01753	-0.01753	-0.01753
0.02	-0.00486	-0.00486	-0.00486	-0.01211	-0.01211	-0.01211	-0.01314	-0.01314	-0.01314
0.03	-0.00398	-0.00398	-0.00398	-0.00865	-0.00865	-0.00865	-0.00828	-0.00828	-0.00828
0.04	-0.00279	-0.00279	-0.00279	-0.00541	-0.00541	-0.00541	-0.00431	-0.00431	-0.00431
0.05	-0.00146	-0.00146	-0.00146	-0.00166	-0.00166	-0.00166	-0.0017	-0.0017	-0.0017
0.06	-1.2E-05	-1.2E-05	-1.2E-05	-0.00052	-0.00052	-0.00052	-0.00044	-0.00044	-0.00044
0.07	0.000208	0.000208	0.000208	-2.1E-05	-2.1E-05	-2.1E-05	9.89E-05	9.89E-05	9.89E-05
0.08	0	0	0	-1.1E-16	-1.1E-16	-1.1E-16	-1.1E-15	-7.8E-16	-7.8E-16
0.09	0	0	0	4.44E-16	3.33E-16	3.33E-16	-7.8E-16	-1.4E-15	-1.4E-15
0.1	0	0	0	0	-2.2E-16	-2.2E-16	-3.3E-16	-2.2E-16	-2.2E-16
0.11	0	0	0	0	0	0	-1.1E-16	7.77E-16	7.77E-16
0.12	0	0	0	0	0	0	-2.2E-16	0	0
0.13	0	0	0	0	0	0	1.11E-16	1.11E-16	1.11E-16
0.14	0	0	0	0	0	0	-3.3E-16	0	0
0.15	0	0	0	0	0	0	0	0	0
0.16	0	0	0	0	0	0	0	0	0

Table 4: Sympathetic Debtors, Reclusive Creditors, Low Liquidity (M1)

	M1								
	r = .03			r = .05			r = .07		
Ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	0.005318	0.005674	0.004767	0.004923	0.005449	0.003833	0.004294	0.004352	0.002768
0.01	0.006242	0.006598	0.005579	0.023546	0.024027	0.021223	0.067123	0.065808	0.063143
0.02	0.006736	0.006902	0.005781	0.031995	0.032437	0.029629	0.078469	0.077685	0.076137
0.03	0.008916	0.009373	0.007189	0.040926	0.040854	0.03707	0.088981	0.08843	0.086882
0.04	0.012502	0.012522	0.010447	0.050057	0.049356	0.047462	0.10442	0.10293	0.100919
0.05	0.016602	0.016713	0.014256	0.058651	0.057759	0.055619	0.104124	0.103411	0.100813
0.06	0.021295	0.020806	0.01859	0.070608	0.068139	0.065902	0.104752	0.102958	0.10159
0.07	0.026979	0.026325	0.023138	0.074511	0.07407	0.071775	0.103864	0.102507	0.101455
0.08	0.034764	0.03004	0.025873	0.07438	0.074841	0.072206	0.103746	0.101771	0.100996
0.09	0.038947	0.035846	0.031106	0.074094	0.073024	0.06907	0.103115	0.100787	0.1004
0.1	0.039383	0.038391	0.035021	0.075033	0.071807	0.070878	0.102596	0.101708	0.100123
0.11	0.039794	0.03765	0.033939	0.073698	0.071907	0.069213	0.101965	0.102009	0.100498
0.12	0.03775	0.036337	0.0347	0.072608	0.069	0.067281	0.103696	0.1016	0.099951
0.13	0.035868	0.036193	0.032652	0.072445	0.070028	0.065831	0.103338	0.101328	0.098022
0.14	0.034734	0.033303	0.030405	0.071049	0.068967	0.064581	0.103317	0.099083	0.097273
0.15	0.035581	0.034062	0.030376	0.07151	0.066902	0.064082	0.103092	0.099232	0.097559
0.16	0.03556	0.034693	0.028447	0.070474	0.065676	0.059389	0.101673	0.09703	0.095945
0.17	0.03656	0.033149	0.025583	0.069561	0.062837	0.058083	0.100505	0.097652	0.094194
0.18	0.03662	0.031167	0.024847	0.068959	0.061339	0.056051	0.099201	0.096516	0.093623
0.19	0.03616	0.029371	0.023476	0.068313	0.05969	0.056015	0.09892	0.095587	0.089693
0.2	0.035443	0.028135	0.023773	0.065665	0.058998	0.05577	0.098559	0.093024	0.088114
0.21	0.035029	0.028286	0.02378	0.064327	0.057876	0.053669	0.098127	0.089639	0.0848
0.22	0.034343	0.027356	0.023074	0.063853	0.056609	0.052143	0.09572	0.086897	0.081362
0.23	0.033877	0.028922	0.021527	0.062694	0.05574	0.050565	0.094019	0.084315	0.078279
0.24	0.034354	0.029035	0.021242	0.063199	0.053861	0.048528	0.092294	0.084196	0.077647
0.25	0.033854	0.030005	0.020304	0.062663	0.055353	0.046745	0.091342	0.083657	0.076509
0.26	0.033122	0.0294	0.020698	0.06227	0.053838	0.044828	0.090371	0.081282	0.074299
0.27	0.032569	0.028749	0.019902	0.061371	0.05251	0.043023	0.088388	0.078798	0.072788
0.28	0.032484	0.028686	0.020578	0.059967	0.052383	0.041038	0.088137	0.076729	0.071203
0.29	0.03169	0.028172	0.019984	0.059876	0.051356	0.040035	0.087114	0.07617	0.069323
0.3	0.031741	0.027438	0.020286	0.059457	0.051541	0.039303	0.086182	0.074764	0.06697
0.31	0.031288	0.026982	0.019576	0.059242	0.051053	0.038463	0.085591	0.073067	0.064567
0.32	0.031523	0.027272	0.018872	0.058022	0.050152	0.03805	0.084699	0.071019	0.062802
0.33	0.030928	0.027543	0.019143	0.058312	0.050506	0.037778	0.083821	0.072722	0.061585
0.34	0.031398	0.027224	0.018897	0.058202	0.049345	0.037584	0.083532	0.071697	0.060725
0.35	0.032045	0.026662	0.018103	0.057539	0.04774	0.037835	0.082137	0.070341	0.059147
0.36	0.031903	0.025966	0.018088	0.057239	0.046782	0.03744	0.081653	0.069523	0.05764
0.37	0.031451	0.025795	0.017785	0.056149	0.046129	0.037721	0.080586	0.06863	0.05688
0.38	0.031176	0.024386	0.017427	0.055679	0.045706	0.037233	0.079922	0.066785	0.056732
0.39	0.030633	0.024082	0.016501	0.055994	0.046168	0.036686	0.079749	0.067165	0.057038
0.4	0.029541	0.023775	0.016724	0.055819	0.044915	0.036458	0.079293	0.066536	0.055884
0.41	0.02998	0.024031	0.016854	0.055967	0.044649	0.036568	0.080241	0.065501	0.055602
0.42	0.029577	0.023053	0.016246	0.055508	0.043906	0.035769	0.07893	0.065312	0.054429
0.43	0.028949	0.022442	0.0163	0.054832	0.04338	0.035646	0.07862	0.064211	0.053412
0.44	0.029164	0.022247	0.016174	0.053634	0.042741	0.033826	0.077964	0.063318	0.053774
0.45	0.028492	0.022445	0.015734	0.05324	0.040747	0.03337	0.077619	0.064058	0.053814
0.46	0.028664	0.02248	0.015082	0.053477	0.040722	0.033448	0.076405	0.062583	0.053068
0.47	0.02909	0.022324	0.014469	0.053712	0.04083	0.033705	0.076233	0.062203	0.052507
0.48	0.028274	0.022338	0.014424	0.053332	0.040704	0.033417	0.076577	0.061947	0.051252
0.49	0.028874	0.021283	0.01444	0.052756	0.040308	0.033093	0.074506	0.062055	0.051039
0.5	0.028982	0.021025	0.014512	0.052834	0.041383	0.032468	0.074159	0.060516	0.050415

Table 5: Sympathetic Debtors, Reclusive Creditors, Medium Liquidity (M2)

	M2								
	r = .03			r = .05			r = .07		
Ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	0.002837	0.002377	-0.00023	0.001175	-0.00057	-0.00646	-0.00128	-0.00435	-0.01332
0.01	0.003299	0.003196	0.000277	0.010677	0.008789	0.003629	0.030954	0.027553	0.018422
0.02	0.003546	0.003437	0.000361	0.014604	0.012618	0.007457	0.03693	0.033805	0.02494
0.03	0.004785	0.004672	0.001981	0.019332	0.017675	0.012727	0.043495	0.0401	0.03051
0.04	0.006162	0.005941	0.003839	0.024496	0.022685	0.016758	0.050168	0.046697	0.037591
0.05	0.008478	0.008384	0.006038	0.030119	0.028028	0.022693	0.056004	0.05245	0.042664
0.06	0.011801	0.011519	0.008509	0.035183	0.033056	0.026454	0.061098	0.056469	0.047325
0.07	0.014751	0.014022	0.010125	0.040133	0.036817	0.029582	0.064884	0.059389	0.050232
0.08	0.018438	0.016153	0.012647	0.04332	0.039387	0.032963	0.068595	0.063599	0.053485
0.09	0.020559	0.018119	0.013658	0.046149	0.041928	0.034426	0.071777	0.066305	0.055719
0.1	0.025104	0.021802	0.01687	0.048474	0.043389	0.036233	0.071418	0.066894	0.056649
0.11	0.026203	0.022586	0.018047	0.049684	0.045359	0.037936	0.07155	0.066678	0.058291
0.12	0.024738	0.022122	0.017324	0.049974	0.046232	0.039096	0.070943	0.067591	0.057938
0.13	0.024471	0.021528	0.01739	0.049164	0.045138	0.038354	0.069975	0.067096	0.057947
0.14	0.023922	0.020408	0.016514	0.048375	0.04392	0.03661	0.069218	0.065269	0.057124
0.15	0.023639	0.018802	0.013802	0.04715	0.041886	0.035244	0.068855	0.064341	0.055979
0.16	0.022204	0.018215	0.012588	0.046263	0.041131	0.033543	0.069032	0.063669	0.054945
0.17	0.021007	0.016891	0.011316	0.045068	0.040031	0.031993	0.068447	0.063257	0.052611
0.18	0.020095	0.016205	0.0103	0.043779	0.038881	0.030404	0.067835	0.062129	0.050774
0.19	0.020324	0.015743	0.009069	0.043413	0.037643	0.029344	0.067242	0.061526	0.049167
0.2	0.020442	0.013888	0.007367	0.04265	0.036071	0.027165	0.065337	0.059162	0.047564
0.21	0.020148	0.013589	0.006929	0.041579	0.035294	0.025385	0.06478	0.05704	0.046647
0.22	0.019871	0.01317	0.005887	0.040785	0.033311	0.023944	0.064018	0.055706	0.043957
0.23	0.019579	0.012257	0.004723	0.04001	0.03227	0.022383	0.063402	0.054225	0.043059
0.24	0.018904	0.011723	0.00489	0.038396	0.03065	0.021092	0.062044	0.052688	0.042279
0.25	0.019439	0.011423	0.004427	0.037393	0.029105	0.020212	0.061052	0.051544	0.040222
0.26	0.019268	0.010608	0.003677	0.036783	0.027662	0.018608	0.059388	0.050202	0.038985
0.27	0.019494	0.011115	0.002696	0.035816	0.027135	0.016762	0.058298	0.048647	0.036677
0.28	0.018543	0.010555	0.001692	0.034733	0.02479	0.015883	0.056478	0.046515	0.035144
0.29	0.018233	0.01055	0.001477	0.035159	0.023351	0.014743	0.055287	0.045828	0.034016
0.3	0.01767	0.009493	0.001429	0.034089	0.02218	0.013682	0.053476	0.044845	0.032536
0.31	0.017084	0.008797	0.001489	0.033675	0.020876	0.012399	0.052187	0.042563	0.030967
0.32	0.016026	0.008702	0.000679	0.033171	0.020866	0.011213	0.051198	0.040585	0.029655
0.33	0.015693	0.008655	0.001101	0.033295	0.019575	0.009725	0.05045	0.038829	0.028054
0.34	0.016283	0.008397	0.001295	0.032342	0.018329	0.008602	0.049592	0.036578	0.026492
0.35	0.015693	0.007946	0.000574	0.031699	0.017827	0.007798	0.048366	0.035073	0.025235
0.36	0.015254	0.008303	0.00042	0.031131	0.017233	0.007446	0.047271	0.033536	0.024403
0.37	0.01497	0.007364	0.000444	0.030857	0.016267	0.00711	0.046723	0.032563	0.02275
0.38	0.015643	0.006992	0.000181	0.0304	0.015654	0.005605	0.046098	0.031163	0.021081
0.39	0.015556	0.006473	2.84E-07	0.030276	0.015623	0.004639	0.045716	0.029863	0.01962
0.4	0.015179	0.00649	4.01E-05	0.029645	0.014801	0.00457	0.044736	0.028263	0.018339
0.41	0.014722	0.005734	3.32E-05	0.028796	0.013597	0.003936	0.043487	0.027611	0.016796
0.42	0.014325	0.005724	8.06E-05	0.028798	0.013197	0.003347	0.042153	0.026011	0.01531
0.43	0.014157	0.005945	6.24E-05	0.028542	0.012362	0.00273	0.041766	0.024971	0.014822
0.44	0.014213	0.006126	5.1E-05	0.027632	0.011837	0.002615	0.040964	0.02391	0.013612
0.45	0.01349	0.005128	3.42E-05	0.027172	0.011232	0.001868	0.040483	0.023327	0.012357
0.46	0.013442	0.004918	1.4E-05	0.026686	0.010404	0.001508	0.039442	0.022062	0.011007
0.47	0.012909	0.004373	1.04E-05	0.025945	0.009957	0.001495	0.038985	0.021106	0.009885
0.48	0.012517	0.004271	5.47E-06	0.025288	0.009402	0.001274	0.038512	0.02062	0.009145
0.49	0.012255	0.004106	1.22E-06	0.024248	0.009157	0.000963	0.037733	0.01947	0.008239
0.5	0.012902	0.003285	1.05E-14	0.024022	0.008405	0.000738	0.03679	0.018273	0.00736

Table 6: Sympathetic Debtors, Reclusive Creditors, High Liquidity (M3)

	M3								
	r = .03			r = .05			r = .07		
Ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	-0.00046	-0.00343	-0.00434	-0.00523	-0.01257	-0.0171	-0.01067	-0.02253	-0.03136
0.01	-0.00021	-0.00318	-0.00406	0.001337	-0.00644	-0.01027	0.009329	-0.00163	-0.00833
0.02	-0.00016	-0.00313	-0.004	0.003394	-0.00406	-0.00808	0.014098	0.002114	-0.00361
0.03	0.000489	-0.00246	-0.00337	0.006625	-0.00162	-0.00475	0.017987	0.005618	0.000174
0.04	0.001512	-0.00172	-0.00214	0.010059	0.00201	-0.00015	0.02306	0.010608	0.004837
0.05	0.003114	6.62E-05	-0.00041	0.012795	0.004924	0.00326	0.026534	0.015113	0.008045
0.06	0.005256	0.000544	0.00173	0.01748	0.008468	0.005531	0.029883	0.017968	0.010914
0.07	0.007047	0.002322	0.003197	0.021044	0.010981	0.007306	0.033829	0.020285	0.012711
0.08	0.009821	0.004233	0.004562	0.022294	0.013385	0.00985	0.03593	0.022205	0.014897
0.09	0.010898	0.005448	0.00545	0.024269	0.014583	0.011298	0.03788	0.023657	0.016347
0.1	0.013861	0.007994	0.007747	0.025556	0.015866	0.012077	0.038862	0.024881	0.017125
0.11	0.014147	0.008268	0.008049	0.027542	0.017964	0.012372	0.04001	0.0259	0.01755
0.12	0.013493	0.007358	0.007638	0.028406	0.018998	0.013415	0.040416	0.026649	0.018083
0.13	0.013857	0.007729	0.006937	0.027589	0.018676	0.01304	0.0406	0.027159	0.018241
0.14	0.013927	0.008502	0.007289	0.026551	0.017002	0.012464	0.040179	0.02588	0.018126
0.15	0.011888	0.006993	0.005996	0.026659	0.016564	0.011613	0.038493	0.026042	0.017045
0.16	0.010162	0.005779	0.005235	0.025271	0.016266	0.010785	0.037212	0.024938	0.016219
0.17	0.009858	0.00508	0.004705	0.023804	0.013825	0.009157	0.036296	0.023532	0.014993
0.18	0.009706	0.004628	0.003338	0.022943	0.013195	0.008675	0.035864	0.021984	0.013856
0.19	0.009161	0.003702	0.002521	0.022017	0.01178	0.007524	0.03486	0.021074	0.013151
0.2	0.008198	0.002596	0.001841	0.020702	0.010454	0.006459	0.034216	0.019883	0.012489
0.21	0.007787	0.001492	0.001209	0.019256	0.009133	0.005427	0.032863	0.018665	0.011486
0.22	0.007297	0.000935	0.000672	0.018977	0.008671	0.004833	0.031921	0.017499	0.010374
0.23	0.006719	0.000659	0.000533	0.018085	0.007642	0.004182	0.030796	0.0166	0.009734
0.24	0.005886	0.000246	0.000284	0.017381	0.006738	0.003235	0.029723	0.015594	0.008368
0.25	0.005641	0.000349	0.000268	0.016191	0.005921	0.002628	0.029007	0.01471	0.007358
0.26	0.005001	0.00032	0.000184	0.015595	0.004769	0.00214	0.028714	0.013606	0.006597
0.27	0.004896	0.000182	9.76E-05	0.014609	0.0038	0.001618	0.027792	0.012261	0.005848
0.28	0.003889	0.000108	6.85E-05	0.01333	0.00331	0.001314	0.026591	0.011152	0.005174
0.29	0.003694	6.59E-05	7.88E-05	0.012935	0.002905	0.000911	0.025713	0.010347	0.004547
0.3	0.003483	4.83E-05	4.08E-05	0.012287	0.002174	0.000727	0.024559	0.009576	0.004
0.31	0.002727	3.32E-05	2.43E-05	0.011497	0.001862	0.000705	0.023587	0.008943	0.003489
0.32	0.002551	9.82E-06	4.31E-06	0.010897	0.001461	0.000448	0.022915	0.008031	0.003293
0.33	0.00226	1.13E-05	1.22E-05	0.009708	0.001067	0.000391	0.021782	0.00724	0.002758
0.34	0.00217	1.22E-05	1E-05	0.008922	0.001003	0.000214	0.020849	0.006523	0.002258
0.35	0.001405	7.38E-06	6.72E-06	0.008111	0.00068	0.000146	0.02031	0.005766	0.002122
0.36	0.000929	4.3E-06	4.64E-06	0.007882	0.000564	0.000135	0.01899	0.005032	0.001797
0.37	0.000634	2.61E-06	2.61E-06	0.007022	0.000562	7.63E-05	0.018203	0.004458	0.001497
0.38	0.000673	1.13E-06	1.13E-06	0.005759	0.000348	5.16E-05	0.016767	0.004198	0.001314
0.39	0.000515	-1.1E-14	-2E-15	0.004936	0.000257	3.59E-05	0.015713	0.003706	0.001139
0.4	0.000283	-9.8E-15	-2E-15	0.004406	0.000216	3.75E-05	0.014621	0.003317	0.000865
0.41	0.000419	-1.1E-14	-2.7E-15	0.003804	0.000162	2.99E-05	0.013804	0.003	0.000689
0.42	0.000303	-1.1E-14	-2.2E-15	0.004047	9.57E-05	1.47E-05	0.013394	0.002367	0.000714
0.43	1.73E-05	-1.3E-14	-2.1E-15	0.003367	0.000104	5.17E-06	0.012191	0.002113	0.000715
0.44	0.000111	-1.2E-14	-1.6E-15	0.003035	9.16E-05	2.82E-05	0.011487	0.001895	0.000519
0.45	9.75E-05	-1.3E-14	-1.6E-15	0.002706	6.1E-05	1.28E-05	0.010901	0.001676	0.000457
0.46	-5.3E-06	-1.3E-14	-1.2E-15	0.002442	4.11E-05	1.4E-05	0.00968	0.001532	0.000383
0.47	2.83E-05	-1.2E-14	-1.6E-15	0.001722	4.63E-05	1.07E-05	0.008964	0.001416	0.000306
0.48	3.1E-05	-1.2E-14	-2.3E-15	0.001549	2E-05	6.07E-06	0.008177	0.000961	0.000238
0.49	2.01E-05	-1.4E-14	-2.4E-15	0.001268	1.17E-05	6.07E-06	0.007431	0.000831	0.000157
0.5	1.97E-06	-8.8E-15	-1.4E-15	0.001006	1.65E-05	5.41E-06	0.006966	0.000751	8.8E-05

Table 7: Sympathetic Debtors, Sympathetic Creditors, Low Liquidity (M1)

	M1								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	0.002141	0.001563	0.000274	0.010677	0.001452	-9.2E-05	0.01394	0.002383	0.000599
0.01	0.003753	0.002095	0.002354	0.036999	0.025733	0.024302	0.086196	0.074011	0.071938
0.02	0.008058	0.003793	0.003075	0.043921	0.035171	0.032212	0.093236	0.085343	0.085982
0.03	0.010409	0.007051	0.006153	0.056228	0.045745	0.043234	0.093325	0.099418	0.098374
0.04	0.015219	0.010844	0.010501	0.064246	0.05358	0.054516	0.092999	0.100482	0.102189
0.05	0.025522	0.016467	0.014999	0.064292	0.06571	0.068143	0.093569	0.098994	0.101596
0.06	0.032601	0.021943	0.020362	0.064419	0.070984	0.072732	0.093681	0.099465	0.10269
0.07	0.034292	0.027678	0.027383	0.066521	0.070661	0.07361	0.095543	0.099258	0.10204
0.08	0.031312	0.031992	0.033399	0.06628	0.068884	0.072719	0.096058	0.098538	0.101428
0.09	0.030604	0.034069	0.035884	0.065964	0.068502	0.071152	0.098229	0.098315	0.102172
0.1	0.030252	0.031649	0.037079	0.067431	0.065888	0.068558	0.097295	0.097466	0.102507
0.11	0.031632	0.028721	0.034499	0.067633	0.063951	0.068797	0.096904	0.096653	0.101674
0.12	0.030105	0.025837	0.033143	0.067169	0.062368	0.067028	0.096572	0.097965	0.098573
0.13	0.031071	0.025788	0.029758	0.064934	0.061977	0.067359	0.095842	0.097056	0.09881
0.14	0.029955	0.025312	0.029719	0.066081	0.062256	0.064571	0.093836	0.096236	0.097546
0.15	0.030579	0.024589	0.029079	0.064364	0.062005	0.062244	0.092689	0.093009	0.095307
0.16	0.028723	0.024301	0.027239	0.063579	0.06095	0.061744	0.093583	0.093561	0.093685
0.17	0.027249	0.024979	0.026825	0.060828	0.060121	0.06123	0.094993	0.091805	0.093908
0.18	0.026483	0.025415	0.026844	0.058205	0.058354	0.058799	0.09305	0.08989	0.092229
0.19	0.025209	0.024336	0.026473	0.057866	0.057698	0.056957	0.091879	0.089074	0.090518
0.2	0.025439	0.023969	0.02504	0.056083	0.055628	0.056635	0.090969	0.0862	0.088907
0.21	0.025078	0.025003	0.025025	0.055483	0.054453	0.055279	0.087981	0.084973	0.087067
0.22	0.024465	0.024912	0.024743	0.054245	0.052908	0.053053	0.086944	0.08547	0.085688
0.23	0.023547	0.024075	0.023932	0.054228	0.054872	0.05107	0.084932	0.083333	0.083002
0.24	0.023341	0.023614	0.02394	0.052109	0.053312	0.049901	0.084291	0.082919	0.080921
0.25	0.024015	0.023102	0.023357	0.051241	0.051499	0.048156	0.082514	0.081574	0.079604
0.26	0.022866	0.023461	0.022438	0.051856	0.050156	0.047372	0.082463	0.078893	0.076519
0.27	0.02321	0.022348	0.022598	0.05048	0.049607	0.04642	0.081432	0.07698	0.074148
0.28	0.0239	0.02257	0.022184	0.050471	0.049052	0.045074	0.080744	0.075794	0.073823
0.29	0.023393	0.022566	0.02208	0.050445	0.04861	0.044397	0.078908	0.075641	0.070772
0.3	0.024527	0.022711	0.022487	0.049835	0.048662	0.043078	0.079139	0.073044	0.069314
0.31	0.024052	0.023092	0.022139	0.050395	0.048131	0.043077	0.077257	0.071075	0.068336
0.32	0.025463	0.023076	0.021084	0.050558	0.047537	0.042642	0.077451	0.070242	0.066798
0.33	0.025833	0.022236	0.021266	0.049977	0.046221	0.041541	0.077841	0.069157	0.065411
0.34	0.025478	0.022511	0.021269	0.05005	0.045109	0.04098	0.075713	0.068475	0.06468
0.35	0.025791	0.022585	0.020911	0.049502	0.046235	0.040399	0.075227	0.068096	0.062908
0.36	0.026499	0.022559	0.021409	0.049884	0.047171	0.039812	0.074662	0.067943	0.062747
0.37	0.026485	0.022898	0.020929	0.05	0.047075	0.040256	0.07548	0.066176	0.062384
0.38	0.026219	0.022787	0.020791	0.049722	0.046641	0.039656	0.074583	0.065974	0.060833
0.39	0.025471	0.02268	0.020752	0.050319	0.046512	0.038836	0.073477	0.065525	0.057497
0.4	0.025221	0.022301	0.020611	0.050588	0.046306	0.038777	0.073286	0.065606	0.056797
0.41	0.025518	0.021643	0.020368	0.049295	0.046355	0.037159	0.073161	0.066896	0.056683
0.42	0.025443	0.021781	0.020192	0.049263	0.045681	0.03625	0.073216	0.066019	0.056478
0.43	0.025764	0.021233	0.019606	0.049432	0.044574	0.036216	0.073253	0.065242	0.054743
0.44	0.025904	0.021509	0.019195	0.049288	0.043632	0.035847	0.073392	0.065465	0.054096
0.45	0.025684	0.020991	0.018823	0.048	0.043437	0.036362	0.073591	0.064221	0.054449
0.46	0.025349	0.021161	0.019563	0.0476	0.044786	0.036985	0.072901	0.064629	0.05407
0.47	0.02503	0.021142	0.019583	0.047438	0.044566	0.036445	0.072579	0.065136	0.053382
0.48	0.026021	0.021106	0.019475	0.048117	0.044392	0.036205	0.072184	0.064233	0.05271
0.49	0.025885	0.021231	0.020672	0.047907	0.044369	0.035493	0.071755	0.06473	0.052495
0.5	0.025124	0.021568	0.020368	0.048966	0.044157	0.03608	0.071164	0.064261	0.052688

Table 8: Sympathetic Debtors, Sympathetic Creditors, Medium Liquidity (M2)

	M2								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	0.001934	0.000697	-0.00154	0.005048	-0.00095	-0.00791	0.005132	-0.00391	-0.01495
0.01	0.003112	0.001101	-0.00025	0.016888	0.011428	0.004986	0.040744	0.032133	0.021773
0.02	0.004253	0.001113	-0.00026	0.021928	0.014033	0.008021	0.046893	0.037208	0.027303
0.03	0.005906	0.003859	0.001258	0.027818	0.020554	0.014549	0.05359	0.044481	0.033277
0.04	0.008937	0.004947	0.003467	0.033911	0.025522	0.020917	0.058716	0.050003	0.040323
0.05	0.01081	0.007569	0.005149	0.03851	0.031751	0.025666	0.064521	0.057098	0.046112
0.06	0.015636	0.011783	0.00774	0.043256	0.035297	0.029199	0.068716	0.0605	0.05024
0.07	0.019651	0.012121	0.010748	0.045944	0.038759	0.033495	0.07026	0.065201	0.051907
0.08	0.023311	0.015572	0.015282	0.046916	0.040876	0.034863	0.070978	0.066886	0.054381
0.09	0.025036	0.017832	0.01607	0.047417	0.044102	0.037242	0.070711	0.067862	0.055723
0.1	0.027076	0.02081	0.017367	0.047387	0.045184	0.038821	0.07063	0.067744	0.057976
0.11	0.025676	0.02099	0.017757	0.046949	0.045915	0.038114	0.070136	0.0668	0.056991
0.12	0.024862	0.022024	0.018089	0.047033	0.044463	0.037709	0.069097	0.066824	0.056289
0.13	0.023975	0.020859	0.018119	0.04662	0.042789	0.037225	0.06906	0.064559	0.054711
0.14	0.021636	0.018777	0.0166	0.046117	0.040949	0.036259	0.067882	0.064268	0.051808
0.15	0.022971	0.017447	0.013947	0.045604	0.04067	0.034325	0.067028	0.062895	0.050765
0.16	0.021349	0.016045	0.013682	0.044555	0.040135	0.033153	0.066234	0.06094	0.050424
0.17	0.020131	0.015406	0.012218	0.044062	0.038987	0.031391	0.065454	0.059776	0.050366
0.18	0.020575	0.014708	0.0113	0.041466	0.036682	0.030396	0.06448	0.058556	0.049017
0.19	0.02052	0.013486	0.010135	0.039806	0.034718	0.028579	0.063976	0.057118	0.048028
0.2	0.019633	0.012702	0.008975	0.03903	0.033693	0.026746	0.062625	0.055765	0.046504
0.21	0.019379	0.012532	0.00827	0.038611	0.033132	0.025191	0.060996	0.055904	0.045002
0.22	0.01888	0.011591	0.008	0.038359	0.031247	0.023982	0.059263	0.054818	0.044129
0.23	0.018957	0.011282	0.007043	0.037025	0.029582	0.022906	0.058876	0.053875	0.042933
0.24	0.017819	0.010699	0.005875	0.037326	0.028791	0.021542	0.058908	0.052046	0.041383
0.25	0.017971	0.009839	0.005116	0.037042	0.02765	0.020686	0.057551	0.0496	0.040311
0.26	0.017898	0.009301	0.005277	0.036635	0.0269	0.018989	0.056965	0.048982	0.038304
0.27	0.017402	0.009367	0.003579	0.035514	0.025032	0.017912	0.0557	0.047348	0.036628
0.28	0.01662	0.009123	0.003414	0.034123	0.024096	0.015665	0.054265	0.046086	0.035518
0.29	0.016	0.008886	0.002667	0.033541	0.022986	0.014326	0.053293	0.044335	0.033027
0.3	0.01447	0.008228	0.002209	0.033057	0.021283	0.012598	0.052177	0.042829	0.031997
0.31	0.014609	0.008135	0.001976	0.032094	0.019688	0.011708	0.051181	0.041292	0.030224
0.32	0.014532	0.007639	0.002173	0.032209	0.018778	0.011854	0.050647	0.038958	0.028399
0.33	0.014186	0.006958	0.001775	0.031527	0.017971	0.011047	0.049374	0.037289	0.027301
0.34	0.013967	0.007041	0.00114	0.030359	0.017517	0.009622	0.048272	0.035688	0.025051
0.35	0.013265	0.007129	0.000915	0.029068	0.016976	0.008676	0.047074	0.034373	0.023604
0.36	0.013373	0.006901	0.000565	0.028494	0.016111	0.007867	0.046225	0.032779	0.022051
0.37	0.013127	0.006093	0.000411	0.028574	0.0152	0.007241	0.045603	0.030901	0.020689
0.38	0.01345	0.006061	0.000256	0.027739	0.014741	0.006134	0.044757	0.029747	0.019228
0.39	0.013094	0.005763	6.22E-05	0.027405	0.014299	0.005474	0.042712	0.027983	0.018651
0.4	0.013755	0.00554	4.78E-05	0.026781	0.013824	0.004977	0.041977	0.026915	0.017194
0.41	0.013795	0.005322	-6.8E-05	0.026722	0.013565	0.004683	0.040394	0.025372	0.015419
0.42	0.013328	0.005545	-2.5E-05	0.026746	0.012715	0.003927	0.040371	0.024533	0.014363
0.43	0.013981	0.005466	-6.4E-05	0.026527	0.012547	0.002939	0.039661	0.02364	0.013558
0.44	0.013522	0.005055	3.1E-05	0.025764	0.011527	0.002542	0.039273	0.022566	0.012512
0.45	0.013411	0.004868	3.04E-05	0.024685	0.010844	0.002136	0.039033	0.022261	0.010893
0.46	0.012798	0.004616	7.97E-06	0.024389	0.010712	0.001758	0.038333	0.020957	0.010046
0.47	0.012317	0.004562	4.72E-06	0.023526	0.01041	0.001171	0.037791	0.020304	0.009323
0.48	0.012295	0.004809	1.73E-06	0.023551	0.010011	0.00119	0.03718	0.019649	0.008431
0.49	0.012039	0.004638	1.26E-07	0.02346	0.009862	0.000965	0.036112	0.01883	0.007464
0.5	0.011412	0.004192	4.44E-15	0.023285	0.00947	0.000788	0.035391	0.017876	0.006457

Table 9: Sympathetic Debtors, Sympathetic Creditors, High Liquidity (M3)

	M3								
	r = .03			r = .05			r = .07		
ψ	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001	λ = .01	λ = .001	λ = .0001
0	-0.00056	-0.00413	-0.00601	-0.00191	-0.01163	-0.01669	-0.00619	-0.0201	-0.02809
0.01	4.35E-05	-0.00369	-0.00516	0.00575	-0.00383	-0.00924	0.01766	0.002086	-0.00504
0.02	0.001573	-0.0036	-0.00516	0.008625	-0.00152	-0.00725	0.021286	0.006738	-0.00114
0.03	0.002888	-0.00226	-0.00415	0.012083	0.001339	-0.00416	0.025225	0.012191	0.002735
0.04	0.004333	-0.00098	-0.00248	0.016145	0.005748	0.000142	0.028237	0.016363	0.006742
0.05	0.004963	-4.6E-06	-0.00088	0.018397	0.00925	0.004284	0.033192	0.020004	0.010325
0.06	0.006914	0.003143	0.00139	0.022299	0.011802	0.006777	0.035615	0.021948	0.013247
0.07	0.00938	0.004179	0.003052	0.024385	0.014493	0.008468	0.036956	0.023325	0.015913
0.08	0.01218	0.005455	0.005563	0.025983	0.016269	0.010274	0.038075	0.025588	0.017265
0.09	0.01284	0.007043	0.006254	0.026701	0.017283	0.012082	0.039377	0.026288	0.017789
0.1	0.013942	0.009193	0.007289	0.026485	0.017738	0.01242	0.039756	0.027516	0.018657
0.11	0.014198	0.008782	0.007883	0.026151	0.018388	0.012671	0.040162	0.027757	0.019355
0.12	0.012801	0.008578	0.00713	0.026728	0.018186	0.012099	0.039542	0.027994	0.019255
0.13	0.012622	0.008288	0.007578	0.025788	0.018581	0.012347	0.038606	0.028797	0.019405
0.14	0.011828	0.006682	0.006281	0.024551	0.018009	0.011854	0.037834	0.027704	0.019433
0.15	0.011209	0.005579	0.005123	0.024274	0.016657	0.010794	0.037574	0.027284	0.019071
0.16	0.011019	0.005438	0.00388	0.024054	0.015136	0.009782	0.036635	0.025481	0.017853
0.17	0.010415	0.004218	0.003545	0.022589	0.013396	0.009107	0.035853	0.024392	0.01697
0.18	0.010263	0.003535	0.003018	0.021544	0.011855	0.007462	0.035223	0.023126	0.015866
0.19	0.010048	0.002823	0.002588	0.020605	0.011129	0.006381	0.034753	0.022063	0.014926
0.2	0.009244	0.002002	0.00157	0.019816	0.01019	0.005716	0.033342	0.021143	0.013572
0.21	0.008111	0.001629	0.001526	0.01937	0.009806	0.005265	0.032506	0.020044	0.012864
0.22	0.007513	0.001289	0.00105	0.018853	0.008696	0.004544	0.031249	0.01918	0.011797
0.23	0.006424	0.001023	0.0006	0.018316	0.007991	0.003592	0.030874	0.017817	0.01098
0.24	0.006347	0.000551	0.000347	0.017368	0.00712	0.003125	0.030057	0.016947	0.010097
0.25	0.006048	0.000349	0.000172	0.016461	0.005876	0.002642	0.029041	0.015651	0.009094
0.26	0.00584	0.000226	0.000165	0.015147	0.00552	0.002215	0.027559	0.014991	0.008368
0.27	0.005477	0.000104	4.55E-06	0.014161	0.004795	0.001681	0.026508	0.014367	0.007394
0.28	0.00477	6.6E-05	-4.1E-06	0.013359	0.004146	0.001158	0.026152	0.013206	0.00648
0.29	0.004934	5.02E-05	6.32E-06	0.012735	0.003798	0.000956	0.026263	0.011727	0.006006
0.3	0.004423	7.22E-05	2.54E-05	0.012409	0.003019	0.000577	0.024357	0.010538	0.005048
0.31	0.004193	3.11E-05	3.2E-05	0.011546	0.002332	0.000557	0.022776	0.009916	0.004652
0.32	0.003441	1.45E-05	1.24E-05	0.010486	0.001746	0.000403	0.022552	0.008871	0.004216
0.33	0.002988	1.13E-05	5.74E-06	0.010135	0.001418	0.000277	0.021612	0.008243	0.003741
0.34	0.003475	1.2E-06	4.56E-06	0.0099	0.001153	0.00017	0.021126	0.007387	0.003309
0.35	0.002681	4.35E-06	1.36E-06	0.009083	0.000947	0.000122	0.019886	0.006804	0.002597
0.36	0.002289	-1.2E-14	8.37E-07	0.008657	0.000695	0.000104	0.018758	0.006256	0.002143
0.37	0.002241	-8.7E-15	5.11E-15	0.008223	0.00049	5.68E-05	0.017932	0.00575	0.001738
0.38	0.001733	-1.3E-15	-2.1E-15	0.007289	0.000376	7.46E-05	0.01704	0.00514	0.001547
0.39	0.001511	4.44E-15	-2E-15	0.006451	0.000267	1.07E-05	0.016173	0.004441	0.001347
0.4	0.001273	6.11E-15	4.44E-16	0.005884	0.000188	4.05E-05	0.015691	0.00363	0.000985
0.41	0.001119	8.77E-15	2.78E-15	0.005251	0.000108	2.64E-05	0.014718	0.003134	0.000839
0.42	0.000685	6.77E-15	3.22E-15	0.004757	8.48E-05	2.46E-05	0.013656	0.002717	0.000726
0.43	0.000455	8.77E-15	2.44E-15	0.00447	5.75E-05	2.61E-05	0.013021	0.002228	0.0005
0.44	0.000262	7.77E-15	1.78E-15	0.003925	3.95E-05	1.95E-05	0.01212	0.001957	0.000571
0.45	0.000152	6.88E-15	1.78E-15	0.003355	2.19E-05	6.36E-06	0.01125	0.001466	0.000521
0.46	3.3E-05	3.55E-15	3.33E-16	0.00276	1.38E-05	9.33E-06	0.010764	0.001392	0.000377
0.47	9.95E-05	2.33E-15	2.22E-16	0.002186	1.75E-05	4.75E-06	0.009884	0.001216	0.000302
0.48	9.11E-05	7.99E-15	1.22E-15	0.001557	3.81E-06	1.92E-06	0.008809	0.001093	0.000263
0.49	4.68E-05	6.44E-15	1.11E-15	0.001389	2.51E-06	3.43E-06	0.008228	0.000958	0.000184
0.5	4.32E-05	4.11E-15	1.33E-15	0.001173	-7.4E-06	3.07E-06	0.007815	0.000705	0.000176

Appendix 5

STATA .do file programming.

```
clear
set more off
// Global Variables
set obs 1000000
set seed 14665
gen lambda=0.001
gen liquid=3000000
gen banksymp=(((1-0.5)*runiform()+0.5)/1.fffffffeX-01)
gen psi=1000000
gen double delta=((1-0)*runiform()+0)/1.fffffffeX-01
gen double rho=(((0-(-1))*runiform()+(-1))/1.fffffffeX-01)
gen double seekingbias=1
gen double Lrn=0
// Lrn toggles linear transformation risk neutral preferences of banks
gen double seeking=((((1-(-1))*runiform()+(-1))/1.fffffffeX-01)/20)+((delta-0.5)*(1/25)*seekingbias)
// Gamble
gen double r=rnormal(0,0.03)
gen double ante=(runiform()*10)/(delta^(1/5))
gen double o=runiform()
gen double p=runiform()
gen double W=((1+r)*ante)/p
gen double egR=W*p*((1-seeking)+(p*seeking))
gen double egS=(1-p)*(1+r)*ante*lambda
```

```
gen success=0

replace success=1 if o<=p

// Debtors

gen double q=[delta*egR^(-1*rho)+(1-delta)*egS^(-1*rho)]^(-1/rho)

gen double X=delta^(1/rho)*q

gen double gamma=(X/ante)-1

gen gamma0=0

replace gamma0=1 if gamma>0

// Banks

gen double aversionbias=1

gen double aversion=((((1-(-1))*runiform()+(-1))/1.fffffffeX-01)/20)+((banksymp-
      0.5)*(1/25)*aversionbias)

replace aversion=0 if Lrn==1

gen double disco=(0.9-aversion)+(aversion*p)+r

replace disco=1 if disco>1

// linear bhro independent of debtors

gen double brho=(((-0.5-(-1))*runiform()+(-1))/1.fffffffeX-01)

gen double gammapsi=gamma

replace gammapsi=psi if gamma>psi

gen double gammapsiD=(gammapsi+1)*gamma0*(disco)-1

gen double qparenpsi=[banksymp*((gammapsiD+1)*ante)^(-1*brho)+(1-banksymp)*egS^(-1*brho)]^(-

1/brho)

gen double Xparenpsi=banksymp^(1/brho)*qparenpsi

gen double deity=(Xparenpsi/ante)-1

// Interaction

gsort - deity

gen double cumA=sum(ante)
```

```
gen DumCumseed=0
replace DumCumseed=1 if cumA<=liquid
gen DumCumweed=0
replace DumCumweed=1 if deity>0
gen DumCum=DumCumseed*DumCumweed
egen double DCsum=sum(DumCum)
gen double sucW=success*W
gen double sucWD=success*W*DumCum
gen double DCA=DumCum*ante
egen double DCAsum=sum(DCA)
egen double sucWDsum=sum(sucWD)
gen double bankres=liquid-DCAsum
gen double recgrowthrateU=((sucWDsum+bankres)/liquid)-1
gen Dr=0
replace Dr=1 if r<0
gen double Pj=Dr*gamma0
gen double Pjdelta=Pj*delta
gen double NPj=(1-Pj)*gamma0
gen double NPjdelta=NPj*delta
gen double PjF=Pj*DumCum
gen double NPjF=NPj*DumCum
gen double Pjrho=Pj*rho
gen psi0=0.00
gen psi1=0.01
gen psi50=0.50
forvalues y=2(1)49{
```

```
gen double psi`y'=psi1+(`y'-1)*((psi50-psi1)/49)
}
local psis psi0 psi1 psi2 psi3 psi4 psi5 psi6 psi7 psi8 psi9 psi10 psi11 psi12 psi13 psi14 psi15 psi16 psi17
psi18 psi19 psi20 psi21 psi22 psi23 psi24 psi25 psi26 psi27 psi28 psi29 psi30 psi31 psi32 psi33 psi34
psi35 psi36 psi37 psi38 psi39 psi40 psi41 psi42 psi43 psi44 psi45 psi46 psi47 psi48 psi49 psi50
foreach var in `psis'{
gen double gamma`var'=gamma
replace gamma`var'=`var' if gamma>`var'
gen double gamma`var'D=(gamma`var'+1)*gamma0*(disco)-1
gen double qparen`var'=[banksymp*((gamma`var'D+1)*ante)^(-1*brho)+(1-banksymp)*egS^(-
1*brho)]^(-1/brho)
gen double Xparen`var'=banksymp^(1/brho)*qparen`var'
gen double deity`var'=(Xparen`var'/ante)-1
replace deity`var'=0 if gamma`var'D==0
gsort - deity`var'
gen double cumA`var'=sum(ante)
gen DumCumseed`var'=0
replace DumCumseed`var'=1 if cumA`var'<=liquid
gen DumCumweed`var'=0
replace DumCumweed`var'=1 if deity`var'>0
gen DumCum`var'=DumCumseed`var'*DumCumweed`var'
egen double DCsum`var'=sum(DumCum`var')
gen success`var'=0
replace success`var'=1 if o<=p
gen double sucW`var'=success`var'*W
gen double sucWD`var'=success`var'*W*DumCum`var'
```

```
gen double DCA`var'=DumCum`var'*ante
egen double DCAsum`var'=sum(DCA`var')
egen double sucWDsum`var'=sum(sucWD`var')
gen double bankres`var'=liquid-DCAsum`var'
gen double recgrowthrate`var'=((sucWDsum`var'+bankres`var')/liquid)-1
}
local rates recgrowthratepsi0 recgrowthratepsi1 recgrowthratepsi2 recgrowthratepsi3
recgrowthratepsi4 recgrowthratepsi5 recgrowthratepsi6 recgrowthratepsi7 recgrowthratepsi8
recgrowthratepsi9 recgrowthratepsi10 recgrowthratepsi11 recgrowthratepsi12 recgrowthratepsi13
recgrowthratepsi14 recgrowthratepsi15 recgrowthratepsi16 recgrowthratepsi17 recgrowthratepsi18
recgrowthratepsi19 recgrowthratepsi20 recgrowthratepsi21 recgrowthratepsi22 recgrowthratepsi23
recgrowthratepsi24 recgrowthratepsi25 recgrowthratepsi26 recgrowthratepsi27 recgrowthratepsi28
recgrowthratepsi29 recgrowthratepsi30 recgrowthratepsi31 recgrowthratepsi32 recgrowthratepsi33
recgrowthratepsi34 recgrowthratepsi35 recgrowthratepsi36 recgrowthratepsi37 recgrowthratepsi38
recgrowthratepsi39 recgrowthratepsi40 recgrowthratepsi41 recgrowthratepsi42 recgrowthratepsi43
recgrowthratepsi44 recgrowthratepsi45 recgrowthratepsi46 recgrowthratepsi47 recgrowthratepsi48
recgrowthratepsi49 recgrowthratepsi50
foreach var in `rates'{
gen double diffU`var'=(`var'-recgrowthrateU)
}
gen psis=psi0[1] in 1
replace psis=psi1[1] in 2
replace psis=psi2[1] in 3
replace psis=psi3[1] in 4
replace psis=psi4[1] in 5
replace psis=psi5[1] in 6
```

replace psis=psi6[1] in 7

replace psis=psi7[1] in 8

replace psis=psi8[1] in 9

replace psis=psi9[1] in 10

replace psis=psi10[1] in 11

replace psis=psi11[1] in 12

replace psis=psi12[1] in 13

replace psis=psi13[1] in 14

replace psis=psi14[1] in 15

replace psis=psi15[1] in 16

replace psis=psi16[1] in 17

replace psis=psi17[1] in 18

replace psis=psi18[1] in 19

replace psis=psi19[1] in 20

replace psis=psi20[1] in 21

replace psis=psi21[1] in 22

replace psis=psi22[1] in 23

replace psis=psi23[1] in 24

replace psis=psi24[1] in 25

replace psis=psi25[1] in 26

replace psis=psi26[1] in 27

replace psis=psi27[1] in 28

replace psis=psi28[1] in 29

replace psis=psi29[1] in 30

replace psis=psi30[1] in 31

replace psis=psi31[1] in 32

```
replace psis=psi32[1] in 33

replace psis=psi33[1] in 34

replace psis=psi34[1] in 35

replace psis=psi35[1] in 36

replace psis=psi36[1] in 37

replace psis=psi37[1] in 38

replace psis=psi38[1] in 39

replace psis=psi39[1] in 40

replace psis=psi40[1] in 41

replace psis=psi41[1] in 42

replace psis=psi42[1] in 43

replace psis=psi43[1] in 44

replace psis=psi44[1] in 45

replace psis=psi45[1] in 46

replace psis=psi46[1] in 47

replace psis=psi47[1] in 48

replace psis=psi48[1] in 49

replace psis=psi49[1] in 50

replace psis=psi50[1] in 51

gen diffs=diffUrecgrowthratepsi0[1] in 1

replace diffs=diffUrecgrowthratepsi1[1] in 2

replace diffs=diffUrecgrowthratepsi2[1] in 3

replace diffs=diffUrecgrowthratepsi3[1] in 4

replace diffs=diffUrecgrowthratepsi4[1] in 5

replace diffs=diffUrecgrowthratepsi5[1] in 6

replace diffs=diffUrecgrowthratepsi6[1] in 7
```

replace diffs=diffUrecgrowthratepsi7[1] in 8

replace diffs=diffUrecgrowthratepsi8[1] in 9

replace diffs=diffUrecgrowthratepsi9[1] in 10

replace diffs=diffUrecgrowthratepsi10[1] in 11

replace diffs=diffUrecgrowthratepsi11[1] in 12

replace diffs=diffUrecgrowthratepsi12[1] in 13

replace diffs=diffUrecgrowthratepsi13[1] in 14

replace diffs=diffUrecgrowthratepsi14[1] in 15

replace diffs=diffUrecgrowthratepsi15[1] in 16

replace diffs=diffUrecgrowthratepsi16[1] in 17

replace diffs=diffUrecgrowthratepsi17[1] in 18

replace diffs=diffUrecgrowthratepsi18[1] in 19

replace diffs=diffUrecgrowthratepsi19[1] in 20

replace diffs=diffUrecgrowthratepsi20[1] in 21

replace diffs=diffUrecgrowthratepsi21[1] in 22

replace diffs=diffUrecgrowthratepsi22[1] in 23

replace diffs=diffUrecgrowthratepsi23[1] in 24

replace diffs=diffUrecgrowthratepsi24[1] in 25

replace diffs=diffUrecgrowthratepsi25[1] in 26

replace diffs=diffUrecgrowthratepsi26[1] in 27

replace diffs=diffUrecgrowthratepsi27[1] in 28

replace diffs=diffUrecgrowthratepsi28[1] in 29

replace diffs=diffUrecgrowthratepsi29[1] in 30

replace diffs=diffUrecgrowthratepsi30[1] in 31

replace diffs=diffUrecgrowthratepsi31[1] in 32

replace diffs=diffUrecgrowthratepsi32[1] in 33

```
replace diffs=diffUrecgrowthratepsi33[1] in 34
replace diffs=diffUrecgrowthratepsi34[1] in 35
replace diffs=diffUrecgrowthratepsi35[1] in 36
replace diffs=diffUrecgrowthratepsi36[1] in 37
replace diffs=diffUrecgrowthratepsi37[1] in 38
replace diffs=diffUrecgrowthratepsi38[1] in 39
replace diffs=diffUrecgrowthratepsi39[1] in 40
replace diffs=diffUrecgrowthratepsi40[1] in 41
replace diffs=diffUrecgrowthratepsi41[1] in 42
replace diffs=diffUrecgrowthratepsi42[1] in 43
replace diffs=diffUrecgrowthratepsi43[1] in 44
replace diffs=diffUrecgrowthratepsi44[1] in 45
replace diffs=diffUrecgrowthratepsi45[1] in 46
replace diffs=diffUrecgrowthratepsi46[1] in 47
replace diffs=diffUrecgrowthratepsi47[1] in 48
replace diffs=diffUrecgrowthratepsi48[1] in 49
replace diffs=diffUrecgrowthratepsi49[1] in 50
replace diffs=diffUrecgrowthratepsi50[1] in 51
graph twoway connect diffs psis, ylabel(-0.020(0.005)0.020)
```

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