# 各章脚注

导言

1. Narayana Kocherlakota，《作为经济政策分析工具的现代宏观经济模型》，http://www.minneapolisfed.org/pubs/region/10-05/2009\_mplsfed\_annualreport\_essay.pdf

2. 比如，美国众议院科学和技术委员会于 2010 年 7 月 10 日召开了主题为”建立服务于真实世界的经济科学“的听证会。让宏观经济学者们不开心的是，我们所做的工作，从来不曾偏离过这个主题啊。那好吧。听证会的记录参见 http://economistsview.typepad.com/economistsview/2010/07/building-a-science-of-economics-for-the-real-world.html

3. 参见诺奖得主 Paul Krugman 于 2009 年 9 月 2 日发表于《纽约时报》上的文章《经济学家为何会错得如此离谱？》http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html

4. 如果对基础知识的介绍让您觉得冗长，请接受我的道歉。但是也请您仔细辨别一下您是属于哪个读者群体，看看您是否有按照我的建议掠过了您已经懂得的部分。

5. 参见记者 John Cassidy 出版于 2009 年的《市场是如何失灵的》一书。在经济学里，市场“失灵”的精确含义是：市场的结果不满足所谓的帕累托意义上的效率。本书第 5、6 章将会具体介绍此类的宏观经济学基准模型，在模型中某些市场会呈现出“失灵”。

6. 读者可参考明尼阿波利斯联邦储备银行主席 Kocherlakota 的《作为经济政策分析工具的现代宏观经济模型》一文，亦即本章卷首语的出处。该文与本书（特别是第 4、5 两章）所讨论内容的相关度很高。

1 现代宏观经济学研究方法与 ADM 模型

1. 我推荐的入门读物是 McCloskey 1985 年出版的《经济学的花言巧语》。

2. 参见 Ely (2010a)，文章强调“每个好的理论家的结论都是他假设出来的”。

\3. This general problem, of verisimilitude, may apply to other disciplines as well;I simply do not know enough to say.

370 Notes to Chapter 1

\4. Many economists I know (including me) have had the experience at some point intheir careers, especially at the beginning of a seminar, of having someone say abruptly:“Yeah, that all sounds OK, but it’s all just words, and you need to show us the facts andequations.” The age hoped for by Keynes, when the economist would be considered asequal to the modest dentist, can only ever happen when we all agree (as we now do) touse mathematics to express ourselves. At the very least, we’re made into (possiblyboring) “if-this-then-this” kinds of social scientists.

\5. More recently, another model’s failure to match the facts has led to a similar cottageindustry of economists aiming to be the first to provide a convincing resolution. This isthe so-called Shimer puzzle, named after its creator, economist Robert Shimer of theUniversity of Chicago. I’ll say more about the kind of model Shimer used in chapter 5.

\6. For more in the spirit of this section, I recommend the preface to the textbook of DavidKreps, A Course in Microeconomic Theory (1990). It is about ten pages long, and exceedinglywell done.

\7. See Caballero (2010) for a somewhat opposing view. This is a bit rich, though. Caba-llero is an economist eminently capable of doing it all: integrating formal models andintuitive insights in order to think coherently about new and uncharted territory. For therest of us, it’s better to stick to the rules.

\8. In chapter 5, I will return to the appropriateness of equilibrium analysis especiallyin the context of understanding “transitional” effects from any change in governmentpolicies.

\9. Interestingly, recent work by Farmer (2012) places prices as exactly “causal” in sub-sequent real outcomes. This is done in a way that is completely coherent.

\10. The interested reader is referred to “In Praise of Theory” (Athreya 2007), a nontechni-cal exposition of the Lucas critique and its role in spurring modern macroeconomics.

\11. I say “typically” because there are economists actively engaged in studying brainfunction. See, e.g., Dickhaut, Rustichini, and Smith (2009).

\12. A very well-known, now deceased, macroeconomist is reputed to have said: “A littlebit of ‘Stokey, Lucas with Prescott’ [a colloquial name for a standard textbook] can makeup for a lot of IQ points.”

\13. After all, the earth will be absorbed by the sun within 5 billion years, so that finitedate pretty much puts a stopper on things. Nonetheless, as I will discuss briefly inchapter 4, macroeconomists have, since 1954, found good reasons to relax this assump-tion (in a further illustration of the forces of practicality driving the need for what mightinitially be seen as mathematical esoterica).

\14. The part of economics that deals with the specification of choice behavior is vast.The reader is directed to the helpful nontechnical book of Gilboa (2010) and, if stillinterested, to Kreps (1990) and the references therein for more.

\15. If you look at the literature, you will see, for example, that “hold-up” problemsarising especially in what would be infrequent arms-length transactions, can sometimesbe dealt with by housing a range of activities under one roof.

\16. Nonetheless, some goods may not actually be traded. An example is private spacetourism: until recently, the minimum price at which suppliers of space travel serviceswere willing to carry a tourist exceeded the maximal willingness of any tourist. As a

Notes to Chapter 1 371

result, we saw no space tourism. Nonetheless, this does not mean the markets for spacetravel were incomplete; it’s just that no trades of money for travel were seen to be mutu-ally worthwhile. By contrast, markets for certain goods and services can be incomplete ifbuyers and sellers are unable to attain gains from trade even in the absence of any deliber-ate impediments to trade (such as taxes or direct prohibitions). For instance, I’d like tobuy insurance against losing my keys, and if someone could inspect my attentivenesswhen I come home from work every day (to ensure that I wasn’t just claiming to havelost my keys to get an insurance payout), they might be willing to provide me suchinsurance—but it is too burdensome to obtain such data, and as a result the gains fromsuch transactions go unrealized.

Notice that I have defined private and public goods in terms of physical characteristicsthat either completely preclude parties from being affected by others’ consumption ofthem or fully force parties to be affected by others’ consumption. From this perspective,a world with “public” goods is necessarily a world where markets cannot be made com-plete, and as we will see later, one in which the decentralized pursuit of self-interestgenerally (and especially under linear prices) yields wasteful outcomes. Lastly, whilepublic goods imply market incompleteness, the converse need not hold: there can bemarket incompleteness in a world of purely private goods. In this case, the incomplete-ness may arise from physical constraints on the formation of centralized markets thatthen create the need to “search” for trading partners, or more commonly from politicalconsiderations such as outright bans (e.g., on prostitution and drugs) or heavy taxeswhich eliminate after-tax gains from trade, etc.

\17. If you like counting exercises, notice that with L goods, there would be L2 − L rela-tive prices that one could keep track of, if one felt like it. Why? The price of each ofthe L goods could be expressed in terms of the rate at which it could be traded for eachof the remaining L − 1 goods. This gives us L × (L − 1), or L2 − L prices. So in an economywith, say 15 goods, there would be 15 × 14 = 210 relative prices. But it’s not actuallythat bad—all you really need to know are the relative prices of all goods, relative toany one good. With that you can compute all the other relative prices. If there werethree goods—apples, bananas, and pears—you don’t need all 3 × 2 = 6 relative prices.The simplest thing to do is to express all prices relative to, say, bananas. With this done,there are really only two relative prices to keep track of: the price of apples in termsof bananas, and the price of pears in terms of bananas. One can compute any of theremaining four relative prices with this information. For example, the prices of applesand pears in terms of bananas are 2 and 1.5, respectively, and the relative price of applesto pears is 2/1.5, or 1.33. And the relative price of bananas in terms of pears of 1/1.5or 0.667, and so on.

\18. The need to understand the strategic motivations of market participants (most oftenthose of firms) is precisely why modern economics adopted the formal machinery ofgame theory, especially the branch known as noncooperative game theory. Simply put,noncooperative game theory is what gives economists a formal understanding of whenthe ADM model is an appropriate framework to use to make predictions for outcomes.Chapter 2 will describe the narrow part of noncooperative results that inform us of whenwe can apply the ADM approach.

\19. See Kaplow and Shavell (2002, 35–38) for a further discussion of this point, especiallyas it pertains to the legal profession’s interpretation of what economists mean by theterm.

\20. In fact, even if you forget everything else, as long as you remember the three picturesfrom the Edgeworth box that are in this book, you’ll know something substantive.

372 Notes to Chapter 22 Prices, Efficiency, and Macroeconomics

\1. It will become clear later in this chapter why we’d like not to presume that partieshave more information.

\2. For households, this means that they can (i) sell their entire holdings of endowmentsof commodities and shares in the firms (again, to the clearinghouse), and (ii) then usethe proceeds to buy any combination of goods and services they could afford at the sameset of prices. Notice that firms’ profits at prices P would be known to households, sincethey would be determined by prices and the supply decisions announced by firms in theprevious step.

\3. If, by contrast, a household or firm felt that its decisions constituted a meaningfulproportion of total demand or supply, and the WCH had no way of knowing the truepreferences of the household, it would have incentives to influence the price formationprocess. An intuitive example is given in Mas-Colell, Whinston, and Green (1995), p. 860,example 23.B.2.

One could assume, for example, arbitrarily small costs of falsifying one’s reports ofhow much one would demand and supply at various prices just to manipulate the for-mation of Walrasian prices. In such a setting, any market with “enough” participantswill make such behavior not worthwhile. Roberts and Postlewaite (1976) is a landmarkanalysis of the extent to which the incentives to misrepresent one’s demand and supplyshrink as the economy grows “large” relative to the individual.

\4. If you like, you can assume that the firm owns all the equipment and doesn’t rent itfrom others. Nothing in this story depends on one’s interpretation here.

\5. Actually, when one starts listing these things, the WCH starts to sound more likeWalMart. Also, later on, when we talk about time and uncertainty—which seem to bemissing from this setting, but are actually not—we’ll see that the kinds of goods andservices imagined are even richer than you might think at this point.

\6. Feldman and Serrano (2006), especially chs. 2–6, covers these ideas, and also theirlink with the “jungle” economy of Piccione and Rubinstein (2007) that I mentioned inchapter 1.

\7. Robert Frank (1991) makes this point very vividly in his undergraduate text throughan example of how, in competitive settings, firms can be price takers but cannot remain“passive.” They must constantly look to contain costs in the face of price changes. Hecites a well-known change to the physical profile of trucks over time in response torising gasoline prices. The truck manufacturers were clearly treating high gasolineprices as given, but were then using all the knowledge they had about how to keep costsdown in the face of these prices. A firm that failed to implement these changes wouldhave systematically higher costs, and since they were in a competitive setting where theycould not charge more than their competitors for trucking services, would earn lowerprofits.

\8. Stiglitz (1994) notes that this lack of commitment to withholding reward in the faceof poor performance (by, say, shutting down plants operating at a loss or punishingmanagerial incompetence) was important in the failure of centrally planned societies.

\9. Colloquially, the topic of incentives is synonymous with asymmetric information.When economists speak of the “theory of incentives,” they have in mind the problem ofproviding incentives in the face of informational and commitment-related problems.

Notes to Chapter 2 373

\10. Landsburg (2010), p. 305, contains a vivid example of how such knowledge is impor-tant, and yet inherently inaccessible to a would-be planner.

\11. This point has been famously and effectively made by Hayek (1945). See also Lands-burg (2010), ch. 9, for a worked-out example (the whole chapter is a tour de force inexplaining gains from trade).

\12. Keep in mind that by “efficient” here, I mean “technologically efficient,” namely thatthere is no way for the industry to reshuffle inputs across the firms within it in a waythat produces at least as much of everything, and more of some products, without alsousing more of at least one input.

\13. And all the beneficial coordination above will occur even if the level of output issometimes marred by monopoly power—typically in the sense that it will limit produc-tion to levels where further production would be socially beneficial.

\14. The reader will find useful the perspective given in Kenneth Arrow’s speech “LeonidHurwicz: An Appreciation,” delivered January 3, 2009, and found at http://www.econ.umn.edu/news/hurwicz/arrow\_on\_hurwicz.pdf. See especially the discussion onpages 3–4.

\15. If you know some linear algebra, read on. In infinite dimensions, not all vector spaceshave so-called dual spaces that allow for inner product representations of linear function-als (i.e., linear functionals that look like vectors of prices). In this case, the notion ofcompetitive equilibrium has less descriptive content in the sense that the value of anygiven bundle that a household, for example, is thinking about buying cannot automati-cally be described as “the price of each good times the quantity in the bundle.” For thelatter to be possible, other conditions, essentially equivalent to restrictions on the patienceof market participants, must be imposed.

\16. Fans of Paul Krugman will have a field day with my blatant advertisement forsomething beautiful, and my apparent unconcern with “truth” (applicability). The restof the book, especially chapter 5, will hopefully show that I and my ilk are not actuallydisconnected at all. But pretty is pretty.

\17. The trucking example from the previous section is also an example of how dispersedand specialized knowledge is brought to bear to effectively adapt to changing conditionsin competitive economies. This is related to macroeconomists’ view of market systems’ability to often manage change effectively.

\18. In contrast, for other, usually distributional reasons, political processes often moveto supplant market processes, even when, or especially when, such processes reliablyconfront buyers and sellers with Walrasian prices that all are more or less “forced” totake as given. A famous case was the effort to control gasoline prices via direct andcomplex limitations on prices themselves s undertaken by Presidents Nixon and Carterin the wake of spikes in the cost of crude oil, the key input to the production of gasoline.As for the difficulties with such an approach, the reader is again directed to the text ofLandsburg (2010), p. 305. His example is precisely set up to illustrate how, if the worldworked as if there were a WCH, a change in the cost of production, even when com-pletely unanticipated, leads to changes in the mixes of inputs being used by each pro-ducer such that, given the new reality of production costs in the wake of the change,there is no possible way to reshuffle inputs across producers and obtain more of any oneproduct without sacrificing some of another. This example highlights the likely totalfutility of employing a well-meaning planner (intent only on achieving such “productionefficiency”) to allocate inputs across producers efficiently in a timely manner.

374 Notes to Chapter 2

The example is also a great one because it also highlights an incentive problem inher-ent in eliciting the information such a planner would need. In particular, participantswill not as a matter of course tell the truth about the substitution possibilities they have.They will only do so if such reports are in their interest—i.e., if they can lower their costsor increase their profits.

\19. Economic theorists have also established that Walrasian equilibria will exist in seem-ingly very “badly behaved” economies—such as ones in which markets are incomplete,or ones in which consumers have very peculiar (including irrational) preferences, or onesriddled by various “distorting” taxes or other policies. In these cases, again, existence isan especially robust outcome when the economy has a large number of people or firms rela-tive to the number of goods being traded. This is fortunate, since it is this setting that bothdescribes the “real world” reasonably well and in which the assumption of price takingis likely to be most sensible.

\20. For those who have some familiarity with the Lebesgue measure: the Pareto set willgenerally be one dimension smaller than the set of all allocations, and hence will have arelative size of zero.

\21. I am likely similar to many economists, who vacillate in our opinion about the work-ability and efficiency of decentralized trade. As the important general-equilibrium theo-rist Andreu Mas-Colell (1999) has put it: “As with the optical illusion picture where onemoment you see the old lady and on the next you see only the young lady, so it is withreality: it can appear perversely dominated by externalities, increasing returns and manyother features capable of explaining the locking of the economy in a multitude of posi-tions, or it can look as a majestic display of marginal adjustments pushing the economytowards one, or a few, coherent scenarios.” I personally take the latter view far moreoften, on balance, than the former, as will be seen in the discussion of experimental resultson Walrasian equilibrium.

\22. I refer interested readers to Stiglitz (1994), and for more formality to Kreps (1990),chs. 16, 19, and 20, and the references therein.

\23. As for completeness: A storm blew over a glass-topped table in our yard recently,scattering thousands of extremely small pieces that got ground into the grass. A neighborpromptly informed me that many firms stood ready to perform the complex cleanup jobfor just this sort of situation. A classic article suggesting just how pervasive markets are,even for goods that may seem hard to define, is Cheung (1973) on how beekeepers andapple growers coordinated to deliver markets in what might have seemed initially to beplaces ripe for incompleteness.

As for competitiveness, wait for chapter 6, where I’ll talk about the so-called efficientmarket hypothesis.

\24. This is known as having “(Lebesgue) measure zero.”

\25. This logic just uses the negation of the implication of a premise. The statement “Aimplies B” is logically equivalent to the statement “Not B implies Not A.” The latter isusually called “the contrapositive.” For example, if all Americans of Indian descent likeBon Scott–era AC/DC, then we have the statement “Indian-American implies likes BonScott–era AC/DC.” The contrapositive tells us that if we find a person who doesn’t likethis music, they must not be Indian-American.

\26. In most models, the latter will be the set of prices facing households and firms.

\27. Remarkably, this was conjectured in the late 1800s by the great statistician and econo-mist F. Y. Edgeworth.

Notes to Chapter 2 375

\28. To supplement what follows, see, e.g., Kreps (1990), ch. 12, and Mas-Colell,Whinston, and Green (1995), ch. 8, for detailed discussions of the Nash concept thatprovide more precise definitions than I will give here.

\29. The interested reader must read Kreps (1990). It is much deeper (and perhaps clearertoo!) than the treatment here.

\30. A textbook example of such a result, for the interested reader, is given in Mas-Colell,Whinston, and Green (1995), p. 405, exercise 12.D.2.

\31. The papers of Dagan, Serrano, and Volij (2000) and Serrano and Yosha (1995), thebook-length treatment of Gale (2000), and the textbook of Osborne and Rubinstein (1990)contain the details and references to important landmarks in this literature.

\32. The work I noted earlier of Green (1980) and Green and Porter (1984) should be keptin mind.

\33. The volume containing Mas-Colell’s essay, Frontiers of Research in Economic Theory,edited by D. P. Jacobs et al., is excellent; many of the ideas discussed therein by theleading lights of the profession have quite inevitably found their way into this book.

\34. On the notion of evolutionary forces, a narrower question is whether, holding fixeda given trading arrangement, one can explain experimental data. This, as the recent workof Duffy and Temzelides (2009) points out, reverses the order of things usually seen ineconomics, but follows the rich tradition of natural science. Duffy and Temzelides show,very roughly, that often but not always, as the number of participants gets large, playerswho use strategies that are “evolutionarily stable,” rather than hyperrational, trade toapproximately Walrasian outcomes.

\35. Recall chapter 1, in which I described Walrasian equilibria as the “fixed points” of aparticular mapping from prices to decisions made by households and firms.

\36. I thank Doug Davis for very helpful comments on what follows.

\37. Similarly, experiments examining iterative price formation procedures, such as theso-called Walrasian tatonnement mechanism, do not do so well, particularly in terms of“who ends up with what” (see e.g., Bronfman et al., 1996).

\38. Stiglitz (1994) is apropos of this: decentralization works better than everything else,but it may not be ADM-style reasoning of “price taking and optimization under completemarkets” that’s behind the “goodness.”And, we can’t yet fully say what is.

\39. See Stiglitz (1994) for a similar view that suggests that producers make a great manydecisions without the use of prices, instead using “non-price” information. One can nolonger guarantee that efficient coordination has occurred. This, like the view in Makowskiand Ostroy (2001), strikes me as too extreme. Few, if any, employers have the power toset the prices of inputs as they wish. Rather, even big users of an input, such as airlines’use of fuel, seem to be forced into taking these prices as given. As such, their remainingdecisions must be made by treating the price of fuel as a parameter: one they cannotcontrol, but rather one that imposes a constraint which must be included in their overallprofit maximization problem. To the extent that this is accurate empirically, the airlines’actions regarding input use will be coordinated efficiently.

\40. A more serious example is that of the conventional arrangements as in banking andinsurance that one observes where, as I describe in chapter 5, a contracting arrangementplays the role of a large number of markets. Thus, our failure to directly “see” a hugevariety of markets in operation does not mean that outcomes are inefficient.

376 Notes to Chapter 3

\41. And where market power is important and damaging, it might have mostly to dowith other policies already in place, rather than with more organically occurring formsof market power. In the context of innovation policy, see Boldrin and Levine (2008), whoargue forcefully that US policy may well be responsible for a particularly strong injectionof market power into the economy.

\42. An exception is the class of models most often used to study monetary policy, wheresome classes of firms are modeled as having some market power. Still, it is a stretch tosay that the market power in these settings is “significant.”

\43. I want to direct the reader to the very trenchant criticism of Vernon Smith, in Ratio-nality in Economics (2010), regarding economists’ success thus far in effectively thinkingthrough instances of market power.

\44. The reader will also find Farrell (1987) useful for an accessible review and anotherconcrete example of how decentralized trading will not yield a satisfactory (Pareto-optimal) outcome. That essay is also useful for its scientific and neutral perspective onhow to interpret the Coase theorem.

\45. See McMillan (1994).

\46. Overall, however, Stiglitz appears to hold the standard economist view, judging fromchapter 15 of his book. Stiglitz’s book is really about all that’s wrong with the ADM model(which is why it’s relevant to this book), and only peripherally about what’s wrong withplanned alternatives to “decentralized markets.” We both agree that primarily decentral-ized approaches are the best we can do, but we differ somewhat on why that is. Prychitko(1995) is a thoughtful review.

\47. This is not entirely true: recall that all the First Welfare Theorem asks for is localnonsatiation, and that the existence of Walrasian equilibria in “large” economies is guar-anteed by even weaker conditions.

3 Macroeconomists, Efficiency, and Inequality

\1. As for our expertise, the distinguished economist Ariel Rubinstein (2012) says in hisrecent book: “I had the good fortune to grow up in a wonderful area of Jerusalem, sur-rounded by a diverse range of people: Rabbi Meizel, the communist Sala Marcel, mywidowed Aunt Hannah, and the intellectual Yaacovson. As far as I’m concerned, theopinion of such people is just as authoritative for making social and economic decisionsas the opinion of an expert using a model.”

One way you might interpret his statement is that economists’ “thens” are builton so many questionable “ifs” that all other people’s “ifs” have an equal claim on ourattention. I’m sometimes sympathetic to this view, but I hope (and presume) that what-ever, e.g., Yaacovson’s “ifs” were, Rubinstein would hold him to deriving “thens” in acorrect way.

\2. Probably the single best general discussion of these issues for the layperson (thoughit’s dated in places) remains the exceptional book of Okun (1974). My book covers themodels macroeconomists use and so is more technically oriented than his, but Okun’sbook is masterful as a measured statement from a humane economist.

\3. Looking ahead, chapter 5 will cover in detail some models and results that inform uson the extent to which one can view inequality as the visible face of inefficiency.

Notes to Chapter 3 377

\4. Typically, as I will argue below, the right metric is that of a version of the Paretostandard known as an “ex-ante” standard, and interestingly (conveniently?) it will allowwhat look like distributional concerns to reenter the ambit of economists. It is also a smallsleight-of-hand to avoid interpersonal welfare comparisons.

\5. See Gul and Pesendorfer (2007) for a detailed evaluation of the way economists evalu-ate welfare. I’m certainly in favor of what they call “Welfare I,” and I certainly do whatthey call “Welfare II,” but in speaking with those whom I advise, I do (deliberately)wander into Welfare III in the places where I suggest that ex-ante expected utility undera given specification of the utility function is the “appropriate” metric.

\6. Again, Arthur Okun’s (1974) book is a must-read on this point. Okun has in mind thenarrower notion of “production-side” efficiency, though: equalization means a drop inthe output level (or even growth rate) of an economy. My use of the term “efficiency” isin the Pareto sense, and thus is more demanding, in that production-side efficiency isonly one of the requirements.

\7. The US has done this in places: student loans are conspicuously nondischargeable inpersonal bankruptcy. I have done research in this area, and while it is by no meanscompletely settled, an emerging consensus might be that means testing may help societystrike a useful balance between the need of some for protection against income riskwithout making credit costs much higher for everyone else lacking collateral (usuallyyoung, wealth-poor households).

\8. See section 3.I of Mas-Colell, Whinston, and Green (1995) for a clear exposition ofindividual-level deadweight loss from non-lump-sum taxes.

\9. I am clearly glossing over the myriad difficulties in talking about “societally agreed-upon” redistribution. The Rawlsian perspective, which we’ll discuss later, helps on thisscore, to the extent that we agree on the level of risk tolerance to apply when judgingoutcomes.

\10. Taxes on corporations have negative effects because the legal obligation to “write thegovernment a check” does not tell you how the only parties capable of actually payingthe tax (consumers and the people who own firms) are affected. Consumers will paythrough higher prices, owners through lower dividends, and they will do so in amountsthat tax law has no control over.

\11. Now that we have this theorem in hand, we can note that, given the disasters gener-ated by dictatorial or centrally planned regimes, it is a delightful happenstance thatdecentralized trading systems can, even if only potentially, lead self-interested, ignorantparties to equitable and efficient outcomes. “All” that is required is that we have enoughcompetitive markets in which they can trade. Before I knew these results, it certainly wasnot obvious to me that any system would be capable of such performance, let alone onethat asked so little of individuals.

\12. The emphasis on decentralization to deliver efficient, but planned, outcomes isimportant. Much earlier, Hayek (1945) famously argued that the nature of the informationneeded by a planner to arrange for optimal outcomes was exactly what precluded plan-ning from succeeding. Namely, he argued that the planning authority would simply notknow what to ask, as any would-be planner would lack “the knowledge of the particularcircumstances of time and place” (emphasis added). This is an important point to keep inmind. Interestingly, Hayek and others were more silent on incentival role of Walrasianprices, and how they directly dictated rewards and costs for actions. But we see here that

378 Notes to Chapter 4

competitively determined prices might well be crucial to ensuring judicious resource useand work effort.

In this sense, market socialists did not ignore the need to construct a trading institu-tion which aggregated dispersed information, as they are alleged to have, most famouslyin Hayek (1945). See Makowski and Ostroy (1992). However, Hayek’s later critique (1948)did raise the issue that the sheer number of commodities for which households havepreferences would preclude the practical implementation of a WCH for anything but avery abbreviated set of goods. In turn, many important commodities might never bebrought forth.

\13. To revisit the welfare theorems under limited information would take us too farafield, but the exposition in Grochulski (2009) is clear.

\14. Benchmark public finance textbooks are those of Myles (1995) and Kocherlakota(2010).

\15. Strictly speaking, Maskin and Roberts (2008) assume strong monotonicity of prefer-ences (that is, all consumers always like more of all goods). This is asking more ofhousehold behavior than local nonsatiation. But local nonsatiation alone will do.

\16. See Slemrod and Bakija (2008).

\17. The entire issue of ex-ante and ex-post efficiency is closely related to the discussionof “fairness” as an independent basis for policymaking, above and beyond what is pre-scribed by the criterion of ex-ante welfare maximization. Fairness, by itself, is not a usefulcriterion; adherence to it forces one to accept patently absurd alternatives. The interestedreader will enjoy the book of Kaplow and Shavell (2004).

\18. Another example, very casually speaking (because I have little serious knowledgeon which to base my opinion), is the War on Drugs and the costs of its mandatory sen-tencing, in which some families lose primary earners and become disadvantaged relativeto others. These costs may be so high that subsets of American society could see theirex-ante welfare rise from a relaxation in such rules. In other words, maybe we’d all bebetter off ex-ante in a setting where we opt for a regime with less severe punishments(incarceration) and more narcotic abuse. It is, of course, not crystal clear as a tradeoff,but the general idea holds. That is, the ex-ante standard makes the most sense to applyin general, but if one observes huge ex-post inefficiency, one ought to at least ask aboutthe ex-ante benefits one might be getting.

\19. See the work of the important economist Al Roth, a leader in the subfield of “marketdesign,” and his coauthors, who now maintain a blog at http://marketdesigner.blogspot.com/.

\20. One of its leading architects, Narayana Kocherlakota, even happens to be the presi-dent of a Federal Reserve Bank, a macroeconomic policymaking position if there everwas one.

4 Macroeconomic Shortcuts

\1. The interested reader is referred to the testimony of David Colander to the USCongress for the Hearing “The Risks of Financial Modeling: VaR and the EconomicMeltdown” on September 10, 2009, which contains a more extended critique known asthe “Dahlem report.” It is available at http://gop.science.house.gov/Media/hearings/oversight09/sept10/colander.pdf

Notes to Chapter 4 379

\2. Speaking of maps, economist John Kay might disagree. See his essay “The Map Is Notthe Territory: An Essay on the State of Economics,” October 4, 2011, on the blog for theInstitute for New Economic Thinking, available at http://ineteconomics.org/blog/inet/john-kay-map-not-territory-essay-state-economics. The response by Michael Woodford(available at the same website) represents my view well.

\3. The reader again is directed to Weintraub (1979) for an in-depth description of thetug-of-war between microeconomic theorists’ use of general equilibrium to reach conclu-sions about macroeconomic phenomena, and an earlier generation of academic macro-economists who felt that such an approach was wrong-headed; the latter felt that startingwith aggregated relationships, e.g., specifying the relationships between aggregate con-sumption and aggregate income, was the only route to progress. The latter did notprevail, and in this sense, we are all microeconomists now.

\4. Some economists have also considered cases in which the economy is not competi-tive—and bargaining of one form or another is used. But for certain kinds of financialassets (as opposed to houses, for example), it is very reasonable a priori, given the find-ings of the literature on the foundations for WE, to study Walrasian outcomes.

\5. This has been going on for a while. Here again is Kenneth Arrow more than sixtyyears ago: “The usual reaction of the ‘literary’ social scientist when confronted with amathematical system designed as a model of reality is to assert that it is ‘oversimplified,’that it does not represent all the complexities of reality” (Arrow 1951).

\6. The short essay of Varian (1989) is an excellent collection of the arguments about whytheory construction is of extra usefulness in economics relative to some of the physicalsciences.

\7. For those interested, the most comprehensive treatment I have seen on the issue ofhow mathematics became lingua franca, and also how it influenced economics itself, isWeintraub 2002.

\8. The essay by Partha Dasgupta (2008) is useful here. It describes how the tools ofmathematical reasoning seem almost preternaturally suited to the questions of econom-ics. It presumes more mathematics than I do here.

\9. See Conlisk 1996 for a detailed review of this and other issues facing research aimedat bringing bounded rationality into practice.

\10. A classic reference is that of Debreu (1984): “Economic Theory in the MathematicalMode.” See also the discussion provided here: http://afinetheorem.wordpress.com/2010/06/28/economic-theory-in-the-mathematical-mode-g-debreu-1984/. I agreewholeheartedly with the viewpoint therein, and would draw the reader’s attentionspecifically to the author’s point about there being no “universal continuity” (continuityin the mathematical sense of the term) in the real world that assures us that “nearlycorrect assumptions lead to nearly correct conclusions.”

\11. By contrast, when the brilliant but untrained mathematician Srinivasa Ramanujanoffered the mathematical world a series of conjectures, the profession’s response was notto accept his claims as is, even though they were already posed in mathematical terms.Instead, he was partnered with mathematicians who could help make these argumentsprecise, to then decide if they were true, given their premises. See Kanigel (1991).

\12. Gale (2000) is a very useful reference on this topic, as well as for the discussion inchapter 6 on off-equilibrium-path restrictions.

380 Notes to Chapter 5

\13. You may wonder, “How can an infinite-horizon model be easier to deal with than afinite-horizon model?” The answer is that with an infinite horizon, every period has theproperty that the payoff, as a function of one’s actions, one can expect to attain frombehaving optimally from tomorrow onward never changes. This immediately lendstractability. If this makes you curious, look up “dynamic programming.”

5 Benchmark Macroeconomic Models and Policy Advice

\1. As should be clear by now, my aim has been to provide a purely intuitive treatmentof how I see theoretical ideas influencing applied macroeconomics and influencing dis-cussions by economists about policymaking. But for inspired readers, Ljungqvist andSargent (2004) remains the best one-stop place to get the full details, especially the “how-to” part that I have not covered at all.

\2. Sir John Hicks (1939) also recognized this, in the narrower case where he saw thesame physical good or service (e.g., gasoline or haircuts) at different dates as distinctcommodities.

\3. The term “stochastic” refers to uncertainty. This logic can be carried further: even inworlds with public goods or, more generally, in cases where one’s actions cannot feasiblybe prevented from having direct (as opposed to price-mediated) effects on others (so-called externalities), one can show that through the construction of an appropriate set ofmarkets, decentralized price-taking optimization can still lead to efficient outcomes. Inthe jargon, this is called a Lindahl equilibrium, and requires that a very particular set ofcommodities be available for sale at Walrasian prices.

\4. Stiglitz (1994) makes this point very nicely.

\5. Again, by “decentralized,” I have in mind trading arrangements in which no one“actively seeks” to improve (or damage) outcomes for anyone else, but instead respondsonly to narrow privately relevant incentives. Of course, these narrow incentives, such asprices, will be the outcome of the aggregated choices of all participants.

\6. The interested reader is directed to Kreps (1990), ch. 6, for a worked-out example.

\7. To echo again the lesson of the First Welfare Theorem, when it comes to the bulk ofthe items we buy daily, as long as people are even approximately sensible in their pur-chases at grocery and department stores, there are essentially no mutually beneficialexchange opportunities left unrealized between any of the 200,000 households in the citywhere I live. This is true despite the fact that we hardly ever know more than the smallestsliver of those living around us.

\8. For anyone else who visits, an important subset of these entities are ones referred tocolloquially as “box stores” (pot-tee kadai in Tamil). These are so small that only theshopkeeper can physically fit inside. Good spot markets seem to operate outside largeIndian cities, too. My sister-in-law has described the ease with which one can reliablyfind (at linear prices) a huge variety of consumer goods (e.g., French shampoo, Americancandy bars, etc.) in even the very remote Himalayan village she spent a year in.

\9. This issue gave rise to the class of SIM models I will describe later.

\10. In the case of markets against the risk of being born into bad circumstances, if weimagine each individual having only a finite life, then we can ask to what extent marketsexist in which he or she can hedge the uncertainty that will resolve over his or her life-time. This more limited notion of “market completeness” is particularly useful; it has

Notes to Chapter 5 381

observable implications that help us assess the extent to which markets fail to allowhouseholds to share risks. Of course, our own descendants will to some extent be repre-sented by us and through the fiscal policies we choose to put into place. We can thereforeaffect them in ways that reflect our concern for their welfare. More on this further below.

\11. Since there is so much confusion among careless observers of macroeconomics onthis point, this is a natural place to stress yet again the mantra “Equilibrium does notmean good”!

\12. This raises the general question of where “power” comes from. Nash equilibriumsuggests that it comes primarily from somehow convincing parties of the likely actionsof other parties. Saddam Hussein, in his heyday, clearly could not have physically pre-vented any large-scale revolt. The key to his success was in convincing essentiallyeveryone else that no one would fight him. Once this was achieved, matters were morestraightforward. In this sense, all dictators who succeed only do so because they somehowconvince enough others that they will be successful.

\13. While space constraints prevent any detailed discussion, an entire area known asglobal games aims to provide more robust prediction than standard Nash analysis ofgames, and has studied especially those settings in which policymakers can transmitinformation to alter outcomes in important ways. Morris and Shin (2001) is good startingpoint, and the recent work of Sakovics and Steiner (2012) illustrates some of the subtleties(and opportunities) for policymakers to steer outcomes to relatively beneficial ones.

\14. But events were not driven only by government policy; the college students whoinitiated the lunch counter sit-in movement are an example of private initiative thatstarted the change in society. These four people played a strategy that was not Nash;given the actions of others that they surely rationally expected, and with substantiallikelihood, their act was potentially dangerous to their physical well-being. This is whatmade it so courageous. And since this act led to other sit-ins elsewhere, one might argueit was extraordinarily powerful. For some details, see, e.g., http://www.sitinmovement.org/history/greensboro-chronology.asp.

A striking telltale sign of the role of expectations for behavior was the policy ofWoolworth stores at the time to “abide by local custom.” Of course, when the customdid change, so did the stores’ behavior toward African-Americans at the lunch counter.But keep in mind that economic theory would not have predicted this outcome at all; itwas as far from Nash as possible to change customs in such a way. This is especially sobecause those who initiated the movement were essentially grains of sand on a beach,and so they would have had no rational reason to think they could change outcomes ata societal level.

\15. The interested reader will find Leeper (2010) well worth reading. It is nontechnicalfor the most part. It contrasts the extent to which the modern descendants of the Walra-sian tradition are especially heavily used within institutions that form monetary policy,while fiscal policy, as practiced, is less influenced by this tradition.

\16. Readers who are not technically oriented and who want to read further about theNGM, as well as an entire class of so-called endogenous growth models, are directed tothe prescient text of Upton and Miller (1986), and the contemporary textbook of Wil-liamson (2010). More advanced presentations are offered in the important text of Barroand Sala-i-Martin (1993), as well as the book of Romer (2011).

\17. More generally, the Malthusian conclusions follow even when more equipment canbe added, and even when innovations routinely make labor more productive (as washappening even before the eighteenth century). The critical features are the presence of

382 Notes to Chapter 5

at least one input to production being completely fixed (in Malthus’s case, this was land)and the positive dependence of the population growth rate on the average income ofworkers. See the excellent set of lecture notes available on Stephen Parente’s website:https://netfiles.uiuc.edu/parente/Econ509/Chapter\_Malthusian\_Model.pdf

\18. Easterly (2001), ch. 4, describes this effectively.

\19. A very useful interactive learning tool for the Solow model is here: http://www.eurmacro.unisg.ch/tutor/Solowpc.html

\20. The reader interested in more details on the Solow model, as well as models thatdiffer from the Solow-Swan class (“endogenous growth” models), should read the excel-lent intuitive approach taken in Ray (1998), and then, if still interested, consult eitherAghion and Howitt (1993), Barro and Sala-i-Martin (1993), or Acemoglu (2009).

\21. See, e.g., Summers (1986).

\22. Put slightly differently: even absent any decision to modify one’s model to avoid themultiplicity of Walrasian equilibria, and/or any wild fluctuations in the time path of agiven Walrasian (Radner) equilibrium, there is still a lesson. BM and SMD are applicableto complete-market economies in which the First Welfare Theorem holds. In other words,even in a model where there are thousands of Walrasian (or Radner) equilibrium out-comes, SMD and BM in no way negate the fact that every single one of those outcomesis Pareto-optimal!

\23. Mas-Colell, Whinston, and Green (1995, ch. 17) is an excellent place to go for anyonewanting to know more.

\24. Later on, we’ll see how the desiderata of having (at least local) uniqueness in theWalrasian outcomes of a model, and that of working with a model in which paths donot fluctuate in seriously counterfactual ways, led to a strategy known as “calibration”and the class of models known initially as “real business cycle” or RBC models.

\25. The interested reader can get a friendly introduction to this topic in Mas-Colell,Whinston, and Green (1995), ch. 20.

\26. As Meyer and Sullivan (2009) and others have noted, all of our conventional mea-sures of inflation substantially overstate inflation, and thereby understate the improve-ments in well-being that we have experienced in just the past several decades—a periodin which measured median wages have stagnated. And once consumption is used as themeasure of poverty, measures have shown a substantial decline in poverty over thisperiod as well.

\27. I realize that long-term unemployment can be scarring. But notice the extreme short-term cost I’ve assumed here: people have zero opportunities for five straight years. Thus,we’ve not likely understated the pain felt by the people concerned.

\28. A wide range of seemingly disparate phenomena are evaluated this way by macro-economists because, from the perspective of the residents of a given country, many things“look like” technological progress, even when they are not literally technological. Forexample, by undervaluing its currency, a country makes its products cheap. To the resi-dents of another country that imports goods from the first country, it is just as if someone,somewhere, discovered a cheaper way to produce. The same is true for the tax policiesof foreign nations that favor their own exports. Either way, domestic consumers winsince they now obtain goods more cheaply than otherwise, while the domestic producersof competing goods will lose.

Notes to Chapter 5 383

\29. The reader will likely find it useful to read William Easterly’s (2001) book (also aimedat a general audience), where he makes this point very effectively.

\30. The whole article is short, and very accessible. See Lucas (1990).

\31. An interesting exchange took place in the late 1980s between the economistsWilliam Baumol and Edward Wolff (1986, 1988), who found direct evidence in supportof the Solow model’s predictions for convergence across countries; but DeLong (1988)neatly showed that Baumol and Wolff ignored measurement error and selection biassuch that the results were biased far too much in favor of finding convergence. Thiswas important because it meant that, as of the 1980s, we did not yet have a satisfactorytheory of cross-country income differences. We still have a ways to go in this quest eventoday, and this, and its cousin “growth,” dominate all other concerns macroeconomistsshould have.

\32. Arthur Okun (1975) talks about “trickle-down” in ways related to my use of it.

\33. I was led to this observation by the related idea in Frank (1991), ch. 18, on the rise

in living standards over time within a country.34. See e.g., Romer (2011).

\35. This is because at this growth rate, average US income in 2046 will be roughly100,000 (in current dollars), while average European income will be 80,000.

\36. A rather accessible, largely nontechnical exposition of the facts surrounding differ-ences in hours worked is given by Rogerson (2006). More recently, Rogerson (2009)provides a completely nontechnical summary.

\37. A state-of-the-art survey on the effect of taxes on labor supply is Keane (2011).

\38. As a related and completely informal observation, it seems clear that the manner inwhich nations intervene in economic outcomes may be crucial in determining the extentto which redistribution places them on Hayek’s 1944 “road to serfdom.” Western Europe,which intervenes principally via taxes and transfers, has certainly avoided such a fate,by all accounts. In light of the individual liberties enjoyed by its citizens, especially“negative liberties” (i.e., freedom from the state and others in their personal lives), it is astretch to argue that they are serfs. Nonetheless, societies that have opted for substantialintervention in the form of licensing restrictions and explicit control of production methodsand the scope of products consumed or permitted to be imported and exported havebeen places where the individual has been treated by the state as spectacularlyexpendable.

\39. The slides by Michele Boldrin and David K. Levine on “Full Appropriation andIntellectual Property” (2007) are useful: levine.sscnet.ucla.edu/papers/slides/ostroy\_slides.pdf. Recall that when I discussed Ostroy’s view of “no surplus,” I noted that itforced one to think differently about prices. This is related to Ostroy’s conceptionof competition allowing—or actually forcing—innovation. An ongoing blog thatfrequently provides thoughtful assessments of models of innovative processes (andmany others—including excellent discussions of the financial crisis) is A Fine Theorem,http://afinetheorem.wordpress.com/. (Full disclosure: I know the anonymous authorpersonally).

\40. Recall Robert Frank’s trucking example that I footnoted in chapter 2 when I discussedthe “informational role of prices.”

384 Notes to Chapter 5

\41. Plosser is now an important macroeconomic policymaker: he is the president of theFederal Reserve Bank of Philadelphia. Recall that another important contributor tomodern macroeconomics, Narayana Kocherlakota, is also a Federal Reserve Bank presi-dent. It should be apparent by now that the ideas in this book are important for policy-making—several of the ideas originated among people who make macroeconomic policy.

\42. In 1986, The Federal Reserve Bank of Minneapolis Quarterly Review carried an expositionof the approach I just described by Edward Prescott. The interested reader will find itinstructive. The same issue also contains a “reply” article by the eminent economistLawrence Summers (former Treasury Secretary and president of Harvard University,among other things).

\43. A scathing, tongue-in-cheek evaluation of Keynes’s ideas is given by Michele Boldrinand David K. Levine in “All the Interesting Questions, Almost All the Wrong Reasons,”online at http://www.dklevine.com/papers/keynes.pdf (last accessed February 26,2013).

\44. Good introductions to such models are Farmer (1999, 2010) and the connections toKeynesian models in the important paper of Cooper and John (1988). Some other pio-neers of adapting the SGM to settings in which “self-fulfilling prophecies” may flourishare Costas Aziariadis, David Cass, Jang-Ting Guo, and Karl Shell.

\45. One prominent example is that of Hornstein (1993).

\46. In my most ecumenical moods, I am tempted to say that such reasoning applies evento the crudest versions of Keynesian economics peddled today. And perhaps that is theright way to view it.

\47. See, e.g., the views expressed by John Quiggin: http://economistsview.typepad.com/economistsview/2011/01/zombie-economics-and-just-deserts.html.

\48. The testimony of the critics of modern macroeconomics before Congress, which wascited in the preface, is just one example.

\49. Again, that these models have been standard fare in macroeconomics for two decadesnow, while outsiders have suspected us of having only a representative agent to dealwith, is a clear measure of the spectacular gulf that exists between what macroeconomistsdo and what many seem to think we do.

\50. Formally incorporating the search process into a household- or firm-level decisionproblem is involved, but if you study these models further, you’ll see that thanks to amathematical method called dynamic programming (nothing to do with computerscience, by the way), there is a tractable way to do it.

\51. A (very) technical paper that studies the question of the existence of simple kinds ofstationary equilibrium (so-called time-homogenous Markov equilibria, or THME) isDuffie et al. (1994). These authors motivate the study of stationary equilibria as the onlyones that are possibly “learnable.”

\52. This is mildly tautological, given the importance of unemployment for determiningthe state of the economy!

\53. Diamond, Mortensen, and Pissarides are all Nobel laureates.

\54. The interested reader is directed to Lucas (1985) for the most lucid account I haveseen of what the search approach buys. It is occasionally mildly technical.

Notes to Chapter 5 385

\55. See chapter 1 in Ljungqvist and Sargent (2004).

\56. For the interested reader, the introduction to Magill and Quinzii (1996) is an out-standing description of many things we have discussed—but particularly of the modernseparation of the study of markets into that of real versus financial ones, beginning withthe efforts of the great Irving Fisher. It requires some technical proficiency toward theend of the section, however.

\57. See Athreya and Romero (2012) for a nontechnical discussion of economic mobility.58. Robert Aumann (1964) made this point formally a half-century ago.

\59. The 2009 movie The Informant! is somewhat insightful in its description of themechanics of setting up collusive arrangements.

\60. For those with familiarity with measure theory: Geanakoplos and Polemarchakis(1986) showed that the set of economies for which Walrasian outcomes are inefficient hasfull measure. Very recently, Davila et al. (2012) have extended the analysis of Geanako-plos and Polemarchakis to SIM models of the kind developed by Aiyagari (1994) andhave shown that the size of the inefficiency may be large.

\61. I have this feeling from time to time. My wife and I are comfortably positioned inthe overall US income distribution. My extended family is close-knit and very highlyeducated. My children could be lazy, and they could be poor students in high school,yet in neither case would they ever feel the pinch of true deprivation. By contrast, achild with poor cognition, born into a poor household less than 20 miles from me indowntown Richmond, Virginia, is unlikely to escape poverty—if we take the data onintergenerational mobility even a little seriously. This strikes me as a risky world to beborn into.

\62. Recall chapter 4 where we noted the seminal work of Robert Barro (1974), who iso-lated conditions under which a limited form of concern for one’s descendants wouldturn the problem facing a dynasty into exactly the problem of a single household thatlived forever.

\63. A metaphor may help illustrate why one ought not to expect that decentralizedoutcomes will inexorably lead to Pareto-optimal outcomes. Imagine a set of townsarranged along a river. Those upstream, if they cannot trade or interact with those down-stream, may well use the river in ways that leave it foul and polluted by the time itreaches the latter.

\64. You may be appalled that I have spent nearly the entire book on a model in whichmoney plays no role. But this is part of what showing you the benchmark model requiresone to do. The huge amount of work in monetary economics overwhelmingly uses vari-ants of the NGM, the SGM models, and less often, search models. Walsh (2010, chs. 1–3)gives an excellent exposition of monetary models based on these benchmarks, whileChamp and Freeman (2001) uses the OG model throughout.

\65. In fact, he called the paper “National Debt in a Neoclassical Growth Model.”

\66. The very accessible text of Obstfeld and Rogoff (1995), ch. 3, is a great place to seeclearly worked-out examples of the OG model. The reader will also benefit greatly fromthe wide-ranging 2005 interview with Nobel laureate James Heckman, who is dispro-portionately responsible for what economists know about the role of policy in skill for-mation, racial disparity, and the intergenerational transmission of economic status. It

386 Notes to Chapter 6

can be found on the Federal Reserve Bank of Minneapolis website at http://www.minneapolisfed.org/publications\_papers/pub\_display.cfm?id=3278.

6 Macroeconomic Theory and Recent Events

\1. “The Financial Crisis: A Timeline of Events and Policy Actions,” Federal Reserve Bankof St. Louis website, http://timeline.stlouisfed.org//index.cfm?p=timeline (accessedMarch 3, 2013). Let me stress that even the facts are not fully agreed upon (see Lo 2012).

\2. And why did short-term liabilities become so attractive? Many observers argue thatit was an easy way to obtain funding from entities like money market mutual funds thatwere awash in available funds (see, e.g., Brunnermeier 2009), while others have pointedto low-interest-rate policies and international conditions (the so-called global savingsglut).

\3. See, e.g., Guvenen (2012) and the references therein.

\4. Recall, though, that in instances where the transacting parties have some degree ofmarket power, as well as hidden information relevant to determining their willingnessto trade, the Myerson-Satterthwaite theorem becomes applicable. Thus, in some cases,macroeconomists are being optimistic when they presume bilateral efficiency.

\5. On consumer theory, Deaton (1991) remains the best place to start, while for corporatefinance the easy-to-read textbook of Saunders and Cornett (2010) will be useful.

\6. See Athreya, Tam, and Young (2012), Sánchez (2012), and Livshits, MacGee, and Tertilt(2011), for analyses of better screening methods in the case of unsecured credit markets.

\7. Recent work of Kasa, Walker, and Whiteman (2012), Tsyrennikov (2012), Colacito andCroce (2012), Cogley, Sargent, and Tsyrennikov (2012), and others illustrates progress,and clarifies some of the significant difficulties in models where intelligent traders havediffering views. We’ve cited Veldkamp (2011) already; it, and its references, are obviouslyrelevant here as well.

\8. Gale and Hellwig (1985), Williamson (1987), and Lacker (2001) are other importantlandmarks in the theory of debt.

\9. In the context of labor markets, an exception to this point is if one really thinks thatthe uneven assignment of hours to workers is due to some policy.

\10. While not a search model, the work of Lorenzoni (2008) on externalities leading toinefficient credit booms, and the references therein, will be useful to the interested reader.

\11. See the recent book of the economist John Taylor (2009), and a detailed and probingreview of it by John Cochrane, available on his blog “The Grumpy Economist,” June14, 2012, http://johnhcochrane.blogspot.com/2012/06/taylors-first-principles.html(accessed March 6, 2013).

\12. A recent speech by the president of my employer, the Federal Reserve Bank of Rich-mond, describes two opposing views of financial instability: inherent fragility (of theDiamond and Dybvig type) or induced fragility (created by policymaker promises tohelp distressed institutions). The speech is available at http://www.richmondfed.org/press\_room/speeches/president\_jeff\_lacker/2013/lacker\_speech\_20130212.cfm.

\13. Let’s be concrete with another example (go back to chapter 2 if you wish to reviewthe other ones I gave). Let’s say that the value of maintaining a doctor’s office in a quiet

Notes to Chapter 6 387

office park was 100,000. And let’s say that the same business next door to a confectionerwould be worth less: 60,000. Now let’s say that a confectionery generates profits eachyear that make it worth 70,000 as a “going concern” no matter where it is located, butto move it far away from the city costs 30,000. The owner of both enterprises wouldthink carefully about the costs and benefits of moving the businesses apart—it mightraise her profits. If they were initially next door to each other, what should she do?Leaving them in place makes the total value of both businesses 130,000 (60,000 +70,000). If they were apart, they’d be worth 170,000. Clearly, then, the owner shouldmove the confectionery: it costs 30,000 to do so, but generates 40,000 in extra value.We can hopefully agree that this is the efficient thing (certainly in the narrow sensethat it makes production more valuable and, by presumption, leaves consumersunaffected).

Now think of a setting in which the businesses are indeed next door to each other,and each business is run instead by a single owner (a crotchety doctor and a crazedchocolate factory magnate—who do not like each other), and that these owners do notinherently share any interest in maximizing the collective value of both businesses. Andlet’s add that the law has taken a position on who is “liable” for compensating the otherfor the damage caused to the other. Perhaps most naturally, let’s say that the law requiresthe confectioner to pay the doctor 40,000 in compensation to offset the reduction inthe doctor’s franchise. Under these rules, what would the confectioner do? He wouldmove: it is worth paying 30,000 (his moving cost) to save 40,000 in payments to aguy he doesn’t like anyway. Alternatively, what if the law ignored them, asking thedoctor to “just deal with it” by not obligating the confectioner to make any payments atall? Would the same result ensue? It depends. If the two parties could agree to find asolution that made the value of both firms together as high as possible, they’d then beable to split the gains in ways that left both better off. In this instance, the doctor mightpay the confectioner 30,001 to get lost. The confectionery would take the money andrun, and the doctor too would come out ahead—since the value of his business jumpsby 9,999 (the 40,000 gain because he no longer has any noise less the 30,001 paymenthe makes to “Wonka”). Critically, the eventual location of each business is the same, andthe total value of both businesses is exactly as if the same person owned both businesses:140,000 (100,000 noise-free doctor’s office, 70,000 confectionery, minus $30,000 inmoving costs), with the only difference being who has to pay for this to happen. If theycould not negotiate with each other (perhaps because they have miscommunications andhave reached some point of no return), then we cannot be assured of any such outcome—and it can easily be the case that the parties miss opportunities to make themselves bothbetter off.

\14. Farrell (1987) is very useful on the extent to which the implications of Coase for policyverge on the tautological. In essence, proponents sometimes seem to be saying: if theparties can reach an efficient outcome, then outcomes will be efficient. To me, the issueis: whenever the costs of communication are low, firms owned by different parties willact like a single firm trying to maximize total value. Thus, on the production side, I viewCoase as an extension of the production-side aggregation result we saw in chapter 4.

\15. It may be obvious, but I’d like to emphasize that any doubt cast on the ability ofpolicy to generate unambiguous improvements is not to be taken as an endorsement oflaissez-faire, which may be disastrous by the measure of Pareto efficiency, and yet leavefew opportunities for well-meaning policymakers.

\16. Making threats credible is also at the heart of ensuring good behavior for a nation’smonetary authority. For example, the Governor of the Central Bank of New Zealand facesa contract in which she or he will be punished monetarily for a failure to take tough

388 Notes to Chapter 6

actions that might, in some cases, inflict pain on the citizenry. The citizenry, for their part,recognize that in order to take actions that yield the best expected path for future eco-nomic activity, one might have to commit to allowing some suffering in the future—ifonly to focus the attention of private decision makers in the present. By setting up thecontract with the Central Bank in this way, they ensure that the Bank will not succumb,by its benevolence, to letting “bygones be bygones.” For, if they were known to do so,any tough talk up front by them would be ignored.

\17. For example, games where parties are not unsure about what others have done arejust a special case of being uncertain about what others have done. Nash equilibrium byitself has a clear weakness, though, in that it leaves open-ended the beliefs players holdabout other players’ previous behaviors when they cannot observe them completely.Ideas like “sequential equilibrium,” “the intuitive criterion,” and “universal divinity”aim to deal with this shortcoming.

\18. According to Kreps (1990), work by McLennan (who also contributed research onstationary equilibria in Duffie et al. 1994) started the literature on how one might try torestrict beliefs off the path of equilibrium play. McLennan is, by all accounts, a very“pure” microeconomic theorist (i.e., probably not waking up to see how he can help mytribe out), and so we’ve now seen two disparate places in which macroeconomists areusing the tools he helped fashion. This is why it is hard for me to see any clear distinctionbetween microeconomics and macroeconomics aside from the scope of the questionbeing asked.

\19. For example, in my own research on the role of how creditors’ lack of informationabout borrowers affects credit card lending, my coauthors and I have modeled a gamebetween borrowers and lenders that is very close, as a mathematical matter, to the famousso-called beer-quiche or Spence job-market-signaling games. We then have employedPBE to select outcomes that do not involve silly threats or beliefs. Lastly, in relation tothe practicality of game-theoretic ideas for the macroeconomics of policymaking, a veryinteresting aspect of games where players move in a well-defined sequence is that whenplayers are modeled as not knowing for sure what transpired in the game previously,one obtains a way to model irrationality. While this topic is too far removed from thegoals of this book, the interested reader should see Kreps (1990, ch. 13) for a descriptionand example of this way of modeling play against an irrational opponent.

\20. Notice that these problems would arise even in the absence of any crisis-related cur-rency distortions.

\21. A layperson’s guide to “systemic risk” and its implications for policy is given inAthreya (2009).

\22. The reader is directed again to Stiglitz (1994). Though it is not a byproduct of therecent crisis, and so is not discussed here, it is a high-water mark for criticism of theWalrasian (and hence, “rational-expectations”) approach. It is also not hurried andbreathless in its zeal to be timely.

As I stated earlier, though I personally think Stiglitz’s book is too strong, and containsquantitative presumptions that one can wonder about, it is essential reading for thosewho want a list of the dental records for each of the bodies buried in the Walrasianfoundation for macroeconomics. (It will also supply endless fodder for those with calci-fied “anti-market” opinions looking to reverse-engineer support for their prejudices, justas Hayek’s writings do for other audiences.) Lastly, another recent offering is the well-meaning paean to “reality-based economics” by journalist John Cassidy (2010). I’d like

Notes to Chapter 6 389

to think of my ilk as “reality-based,” and so I think it’s a bit unfair of him to co-optthe term!

\23. The latest effort belongs again to Paul Krugman. In a typically cunning move,he has penned a “Manifesto for Economic Sense” (available at http://www.manifestoforeconomicsense.org/). While I disagree with his scorched-earth approach,I also really want to make sense.

\24. This is, interestingly, similar to the nonsense that my father, a professional mathema-tician, sometimes has to put up with when told by fellow Indians that Vedic-era math-ematics had already made great advances that rivaled those of modern mathematics: i.e.,essentially, that a David Hilbert or André Weil were simply smart people unwittinglyrediscovering a glorious past.

\25. Interestingly, the archenemy of many critics of modern macroeconomics, MiltonFriedman, was fundamental in building market incompleteness into models of house-hold consumption behavior.

\26. See the complaint of Colander et al. (2010).

\27. In turn, such a view suggests a limited and focused role for central banks, one aimedat the objects central banks can most effectively deal with, such as price stability, bankregulation, and ensuring the integrity of payment systems. (In light of the crisis, anadditional charge that may fall into the ambit of central banking is “macro-prudential”stability. It remains to be seen whether this is a realistic goal.)