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**HUME: THE POWER OF ABDUCTION AND  
SIMPLE OBSERVATION IN ECONOMICS**

**Jorge M. Streb**

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**Hume:**

**The power of abduction and simple observation in economics**

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**Abstract:** In Hume's epistemology, induction leads to discovery in matters of fact. However, because of the poor data Hume analyzes the balance of trade with a thought experiment, doing what Mill makes explicit afterwards: reason from assumptions, to reach conclusions which are true in the abstract. Hume's potential explanation, what Peirce later calls abduction, is backed by a case study, the price revolution of the 16<sup>th</sup> century, which supports half his abductive inference, when money supply is multiplied fivefold. Given that economics reasons abductively, Hume's attention to realistic hypotheses and the adjustment process matters.

**Resumen:** En la epistemología de Hume, la inducción lleva al descubrimiento en cuestiones fácticas. Sin embargo, los pobres datos llevan a Hume a analizar el balance comercial con un experimento mental; como Mill explicita después, razona desde supuestos para alcanzar conclusiones verdaderas en abstracto. La explicación potencial de Hume, que Peirce después llama abducción, está respaldada por un estudio de caso, la revolución de precios del siglo XVI, cuando la oferta monetaria se expande. Dado que la economía razona abductivamente, la atención de Hume a hipótesis realistas y al proceso de ajuste importan.

*JEL codes:* B1, B4, E4, E5, F1

*Keywords:* abduction, case studies, realistic assumptions, Hume, Mill, Peirce, Hayek, Akerlof

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\* The views are personal. I learned a lot from lively discussions with my students at Ucema, among which I fondly recall Guillermo Simunovic and María Sol Zambón. I deeply appreciate conversations with Ignacio Armando, Horacio Caraballo, Alejandro Corbacho, Ricardo Crespo, Celeste González and Daniel Heymann, as well as comments by Jorge Ávila, Daniel Lema and Juan Negri in a seminar at Ucema.

## I. Introduction

In *An Enquiry Concerning Human Understanding*, first published in 1748, David Hume establishes a contrast between “relations of ideas” and “matters of fact”. Relations of ideas can be discovered by reasoning, but matters of fact can only be discovered by experience. This leads to a strict divide between deductive and inductive methods in formal and empirical sciences.<sup>1</sup> On the other hand, in his essay “On the balance of trade”, published in 1752 as part of the *Political Discourses*, Hume resorts to a “general argument” because of the poor data. Though this procedure contradicts his theory of discovery in empirical sciences through induction, it fits in nicely with what Mill (1836) describes as the only method of discovery possible in social sciences due to the impossibility of experimentation, namely, that of reasoning from assumed hypothesis.

The observed facts that motivate Hume’s general argument, in order to show the prevailing views are unfounded, are, foremost, that no country was being drained of its gold and silver, something surprising given the existing fears about a natural tendency of an excess of imports over exports if the government did not intervene. This can be seen as an instance of what Peirce (1903) calls “abduction”, which is another name for guessing or forming hunches: “The surprising fact, C, is observed; but if A were true, C would be a matter of course. Hence, there is reason to suspect that A is true.”<sup>2</sup> In this

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<sup>1</sup> Induction refers to arguments from a random sample to the population (a probable inference), as opposed to deduction, an argument from the population to a random sample (a necessary inference).

<sup>2</sup> In his early writings, Peirce adds abduction as a third form of argument, besides deduction and induction as defined in footnote 1. In his later writings, they become successive phases of inquiry (see, e.g., Peirce 1908). The role of each mode of inference in inquiry is that abduction generates possible hypotheses to account for a surprising phenomenon, deduction clarifies the necessary predictive consequences, and induction tests the predictions against the data: in Peirce’s words, in the *Lectures on Pragmatism* delivered at Harvard in 1903, “Deduction proves that something *must* be; Induction shows that something *actually* is operative; Abduction merely suggests that something *may be*.” Santaella (2004) briefly discusses the

regard, Friedman (1953) closes his article on positive economics by saying that progress requires not only the testing and elaboration of existing hypotheses, but the construction of new ones, “a creative act of inspiration, intuition, invention; its essence is the vision of something new in familiar material”, a process which can be promoted by maxim and example. This describes abduction at its best, and applies to Hume’s contribution: the combination of old materials to explain new facts, introducing the quantity theory of money to the debate on the balance of trade in the mercantilist literature.<sup>3</sup>

Hume mentions the price revolution of the 16<sup>th</sup> century for illustrative purposes, but it acts as supporting evidence: all the lines of his general argument, the specie-flow mechanism, are at work there (the quantity theory of money had also been inspired by the 16<sup>th</sup> century price revolution, see Munro 2007). Among all the potential explanations one could imagine, this episode where there is a sudden increase in the quantity of money lends plausibility to his abductive inference.

The next section presents passages from Hume’s texts on epistemology and economics. Section III identifies the hypotheses in his general argument, and Section IV develops their methodological implications. Section V presents the conclusions.

## **II. Comparing Hume’s texts**

### **A. Discovery in empirical sciences**

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evolution of Peirce’s thoughts on these three types of reasoning. Cf. also entries on Charles S. Peirce in the Stanford Encyclopedia of Philosophy, at <http://plato.stanford.edu/entries/peirce/#dia>, and in Wikipedia, at [http://en.wikipedia.org/wiki/Charles\\_Sanders\\_Peirce](http://en.wikipedia.org/wiki/Charles_Sanders_Peirce).

<sup>3</sup> Wennerlind (2008) analyzes the precursors to Hume’s specie-flow mechanism. Paganelli (2006) places Hume’s theory of an endogenous money supply that adapts to demand within pre-modern monetary views.

In the first part of Section IV of *An Enquiry Concerning Human Understanding*, Hume (1748) establishes a strict distinction between “relations of ideas”, like the Pythagorean theorem, and “matters of fact”. For Hume, while relations of ideas can be discovered by reasoning, matters of fact can only be discovered by experience of “relations of cause and effect”:

“I shall venture to affirm, as a general proposition, which admits of no exception, that the knowledge of this relation [of cause and effect] is not, in any instance, attained by reasonings a priori; but arises entirely from experience, when we find, that any particular objects are constantly conjoined with each other.”

The illustrations on relations of cause and effect are drawn from natural philosophy, i.e., physics. Without prior experience, man “could not have inferred from the fluidity and transparency of water, that it would suffocate him, or from the light and warmth of fire, that it would consume him”. The same holds for the movement of a billiard-ball that hits a second ball. As Hume puts it,

“Nor is geometry, when taken into the assistance of natural philosophy, ever able to remedy this defect, or lead us into the knowledge of ultimate causes by all that accuracy of reasoning, for which it is so justly celebrated. Every part of mixed mathematics proceeds upon the supposition that certain laws are established by nature in her operations; and abstract reasonings are employed, either to assist experience in the discovery of these laws, or to determine their influence in particular instances ... but still, the discovery of the law itself is

owing merely to experience, and all the abstract reasoning in the world would never lead us one step towards the knowledge of it.”

Unlike mathematical relations, these empirical relations of cause and effect are contingent: “*That the sun will not rise to-morrow* is no less intelligible a proposition, and implies no more contradiction, than the affirmation, *that it will rise.*”<sup>4</sup>

For Hume, experimentation includes plain observation.<sup>5</sup> Hume emphasizes in the second part of Section IV the need of repeated experimentation, because “It is only after a long course of uniform experiments in any kind, that we attain a firm reliance and security with regard to a particular event. Now where is that process of reasoning, which, from one instance, draws a conclusion, so different from that which it infers from a hundred instances, that are nowise different from that single one? ...I cannot find, I cannot imagine any such reasoning.” In other words, abductive inference from a single case is impossible.

He goes on to say that “nature has kept us at a great distance from all her secrets”, so that, at best, experience leads to fallible knowledge: “all our experimental conclusions proceed upon the supposition, that the future will be conformable to the past”, but “it is impossible, therefore, that any arguments from experience can prove this resemblance of the past to the future; since all these arguments are founded on the supposition of that resemblance.”

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<sup>4</sup> Newtonian physics views the movement of the planets around the sun as necessary. I discuss how necessity applies within the confines of mathematical models in Section IV.

<sup>5</sup> Rotwein (1957), p. xxvii, points out how, in the Introduction of his 1739 *A Treatise on Human Nature*, Hume considers that controlled experiments are impracticable in moral philosophy. Hume goes on to say, “We must therefore glean up our experiments in this science from a cautious observation of human life, and take them as they appear in the common course of the world”.



Despite this philosophical scepticism, “it is certain that the most ignorant and stupid peasants, nay infants, nay even brute beasts, improve by experience, and learn the qualities of natural objects, by observing the effects which result from them”. Hume points out in the following section that what is at play is not reason, but rather custom and habit, which leads us to expect similar cause-effect relationships to those experienced in the past.

### **B. Hume’s approach in practice**

Hume addresses the prevailing fears of his contemporaries with regard to an unfavorable balance of trade that could drain a country of its gold and silver in his essay “Of the balance of trade”. Since the data on the balance of trade are very incomplete and allow to support all kinds of theories, Hume (1752) turns instead to a celebrated argument contained in four short paragraphs that are often quoted:

“In short, this apprehension of the wrong balance of trade, appears of such a nature, that it discovers itself, wherever one is out of humour with the ministry, or is in low spirits; and as it can never be refuted by a particular detail of all the exports, which counterbalance the imports, it may here be proper to form a general argument, that may prove the impossibility of this event, as long as we preserve our people and our industry.

Suppose four-fifths of all the money in Britain to be annihilated in one night, ... what would be the consequence? Must not the price of all labour and commodities sink in proportion, and every thing be sold as cheap as they were

in those [past] ages? What nation could then dispute with us in any foreign market, or pretend to navigate or to sell manufactures at the same price, which to us would afford sufficient profit? In how little time, therefore, must this bring back the money which we had lost, and raise us to the level of all the neighbouring nations? Where, after we have arrived, we immediately lose the advantage of the cheapness of labour and commodities; and the farther flowing in of money is stopped by our fulness and repletion.

Again, suppose, that all the money of Britain were multiplied fivefold in a night, must not the contrary effect follow? Must not all labour and commodities rise to such an exorbitant height, that no neighbouring nations could afford to buy from us; while their commodities, on the other hand, became comparatively so cheap, that, in spite of all the laws which could be formed, they would be run in upon us, and our money flow out; till we fall to a level with foreigners, and lose that great superiority of riches, which had laid us under such disadvantages?

Now, it is evident, that the same causes, which would correct these exorbitant inequalities, were they to happen miraculously, must prevent their happening in the common course of nature, and must for ever, in all neighbouring nations, preserve money nearly proportionable to the art and industry of each nation.”

### **III. The hypotheses behind Hume’s general argument**

Hume's (1752) general argument appears in the texts on history of economic thought under the heading of the specie-flow mechanism. Though Hume considers that the prevailing views are dead wrong, his argument actually implies they are incomplete. Hume's insight is to combine the quantity theory of money with two hypotheses already found in mercantilist writings, in order to derive the workings of the whole system.

The first hypothesis is clearly articulated by Mun in his 1664 work, *England's Treasure By Forraign Trade, or The Ballance of our Forraign Trade is the Rule of our Treasure*, often taken as a definition of mercantilism:

*(i) A positive balance of trade (i.e., more exports than imports) increases the quantity of money, a negative balance of trade diminishes it.*

With no international capital movements, this first hypothesis basically boils down to an accounting identity.<sup>6</sup> Hume makes this part of a mechanism where monetary imbalances are corrected through trade, which is a forerunner of the monetary approach to the balance of payments developed by Mundell (1963) where monetary imbalances are corrected by capital movements.

The second hypothesis is about how price competitiveness leads to a trade surplus, which is consistent with the prevailing views about the importance of stimulating exports, particularly in the mercantilist literature on the convenience of cheap labor (cf. Rotwein 1957, p. xv):

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<sup>6</sup> Indeed, for Ricardo (1817), chapter VII, the distinctive characteristic of the theory of foreign trade is the lack of labor and capital mobility among countries.

(ii) *Buyers purchase goods where they are cheapest.*

This is a principle of arbitrage among goods, where all goods are treated as tradable. The equilibrium counterpart of this proposition is the law of one price.<sup>7</sup>

Hume combines these two hypotheses with the quantity theory of money. This third hypothesis, as first formulated by Martín de Azpilcueta in 1556, and Jean Bodin in 1568, was that the influx of silver from the Americas led to a decrease of the purchasing power of money (cf. Munro 2007).<sup>8</sup> Hume's formulation is that:

(iii) *The stock of money is proportional to the trade, industry and people of each nation.*

Here money demand responds to the transactions motive. Given that the real amount of transactions and the velocity of circulation are implicitly treated as exogenous, Hume in effect follows Azpilcueta and Bodin in assuming that changes in the money supply lead to changes in prices, assuming even more stringently that prices change in proportion to money. This is a special case of Berdell's (1995) second equation, where prices react to differences between money supply and demand, when price adjustment is instantaneous.

In the Appendix, the three assumptions are put together in mathematical terms. They lead to derive the conclusions that, in the long run, the law of one price holds, and the

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<sup>7</sup> For Cesarano (1998), the law of one price also holds in the short run. However, the standard interpretation is backed by the paragraph that immediately follows the general argument, where Hume says prices were ten times higher in Spain than in France because of the inflow of American silver in the 16<sup>th</sup> century. What holds is that money supply always equals money demand (see Appendix).

<sup>8</sup> At the time, the stock of money was constituted by gold and silver. Munro (2007) mentions that negotiable credit instruments, which functioned as paper money, were just starting to emerge.

money stock ends up distributed among countries in proportion to the real volume of transactions.

#### **IV. A methodological analysis of Hume's general argument**

##### **A. The necessary character of Hume's conclusions**

To settle the debate on the balance of trade, Hume (1752) does not center his general argument on empirical regularities, but rather on a thought experiment. He derives a strong conclusion: “the same causes ... must *for ever* [italics added], in all neighbouring nations, preserve money nearly proportionable to the art and industry of each nation”.

Hume is in fact formulating what he describes in Hume (1748) as relations of ideas. Within the bounds of his hypotheses, Hume is absolutely correct, because his conclusions can be derived by deduction, just like the Pythagorean theorem. When Hume confidently asserts that the same causes always produce the same effects, these necessary relations apply to the hypothetical model he constructed, not to a set of contingent empirical regularities.

Schabas (2008), pp. 167-168, points out that Hume seeks to isolate certain tendencies in the hypothetical world of his monetary thought experiments, but he is aware that other factors are at work in the actual world. As in Hume's general argument, for Mill (1836) the conclusions of economic reasoning are completely valid only in the abstract. Conclusions are true in the concrete once proper allowances are made for disturbing

causes that may have been *overlooked*, so the empirical validity of a theory has to be ascertained in each particular instance.<sup>9</sup>

Perhaps, Hume's assertions are intended to be a bit stronger. For example, Hume's second hypothesis about arbitrage is an instance of a much more general hypothesis in relation to commerce formulated in Hume's (1742) essay "Of the rise and progress of the arts and sciences", namely, that "Avarice, or the desire for gain, is an universal passion, which operates at all times, in all places, and upon all persons". Hume treats self-interest as a determinate cause because it operates regularly on a great number, in contrast to passions like love of knowledge, which are subject to private whim and operate on few persons.

Though Mill (1836) says the definition of a man in economics, as someone who desires to possess wealth, is arbitrary, just as the definition of a line in geometry as something with length but without breadth, he nonetheless shares Hume's confidence in its empirical validity. Mill's justification is introspection. This is not at odds with Hume, given that, starting with Descartes, modern philosophy takes human consciousness as the only thing we can be certain about (Kenny 2006, chapter 4). Dow (2009) recognizes that introspection provides a distinctive source of evidence for Hume, but because of imperfect recall Hume regards historical knowledge, and third party observation, as more reliable.

Mill (1836) derives a startling conclusion from the classical definition of economics: political economy is an abstract science like geometry, whose method is to reason from

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<sup>9</sup> Even the Pythagorean theorem depends for its applicability on whether the world is Euclidean or not.

assumptions, not from facts.<sup>10</sup> As to the method a posteriori, of induction or inference based on direct evidence, for Mill it is not possible in economics and moral sciences due to the impossibility of experimentation and crucial experiments.

Hausman (1994), pp. 38-40, notes that Mill's views were influential, before Friedman (1953) became the most influential work on economic methodology. Keynes (1938), for example, echoes Mill's views when he says that while economics is a science of thinking in terms of models, a good economist needs the gift of vigilant observation, which requires intimate and messy acquaintance with the facts, since the material to which models are applied is not homogeneous through time.

## **B. The surprising facts that prompt Hume's abductive inference**

What motivates Hume's essay is that, despite the continual worries, neither England, nor Ireland, nor any other country, is being drained of its gold and silver. To explain these facts that are surprising in the face of the existing beliefs and expectations, Hume builds a general argument that fits the mold of Peirce's abductive inference.

Abduction is a potential explanation: if what is being posited is true, the existing facts can be explained. This is quite different from the deductive-nomological model of scientific explanation posited by Hempel, Hoppers, and Popper, where the predictions are deductively derived from known facts and laws (Klimovsky 1994, chapter 15). By its nature, a shortcoming of abduction is that other arguments may also explain the same facts. Since this was not an era of free trade, a simple mercantilist counterargument to

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<sup>10</sup> Mill (1836) calls this method 'a priori', not in reference to pure deduction, as is usual, but rather to a broader process that involves both experience and reasoning, a mixed method of induction and deduction.

Hume could be that existing state of affairs was precisely due to the prevailing restraints on imports. Like the case of overprotective parents, who don't let their kid ride a bike, and answer their kid's complaint that he never gets hurt with an "Of course, darling, because we never let you do dangerous things".<sup>11</sup>

Crespo, Heymann and Tohmé (2009) distinguish between this weak version of abduction, which is purely heuristic and only offers a potential explanation, and a strong version, Inference to the Best Explanation. In that direction, a way to justify the inference is to find positive evidence that makes the argument plausible. We turn to this now.

### **C. A paradigmatic event that backs Hume's abductive inference**

Peirce uses Kepler's conjecture that planets follow elliptic paths around the sun, which allowed to organize a huge amount of data previously collected, as an example of abduction. Crespo et al. (2009) generalize Peirce's example, pointing out how information about similar situations, as well as features of the specific case, can be used to formulate explanations.

Unlike Kepler, Hume lacks comprehensive balance of payments data. He also lacks macroeconomic data on the stock of money or on nominal transactions, making it impossible to test his key prediction, namely, that no country need fear the loss of its stock of money, because money is always proportional to nominal transactions. Despite

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<sup>11</sup> What is needed to discriminate between the two theories is a country with no trade restraints. Smith (1776), in Book IV, Chapter III, Part II of the *Wealth of Nations*, points out that the country that most approaches free trade, Holland, indeed derives its great wealth from foreign trade. Mill (1836) notes that a crucial experiment on the effect of a restrictive policy upon national wealth is impossible because no two nations are equal in every other respect, and adopt the same policy in all other affairs. We try to get around this problem econometrically by introducing control variables.



the fact that in his epistemological work Hume states that in matters of fact learning is based on repeated experience with a long series of observations that conform to the same pattern and allow to establish an empirical regularity –Mill’s specific experience or induction–, his general argument follows instead the details of one particular historical event because no other empirical evidence is at hand:

“Can one imagine, that it had ever been possible, by any laws, or even by any art or industry, to have kept all the money in Spain, which the galleons have brought from the Indies? Or that all commodities could be sold in France for a tenth of the price which they would yield on the other side of the Pyrenees, without finding their way thither, and draining from their immense treasure?”

This paragraph comes just after his general argument. In this historical illustration, the 16<sup>th</sup> century price revolution, all the hypothesis of his previous thought experiment are at work: there is an exogenous increase in the quantity of money, which is linked to a rise in prices (hypothesis iii), so by arbitrage there is a trade deficit (hypothesis ii), that in turn leads to an outflow of money (hypothesis i). This case study provides a justification for the specie-flow mechanism posited in his explanation.

As to the actual facts, Hamilton (1935) provides the classic study of how the influx of American silver was indeed the main determinant of the price rise in Spain during the 1540-1600 period. Inflation actually started around 1520, before the arrival of great quantities of American silver, something explained by an earlier German and Central European silver mining boom; the silver-based price index in Spain rose from 99 to 321 between 1511-15 and 1596-1600, continuing to slowly creep up to 343 in 1646-50, almost a 3.5 fold rise over the whole period (cf. review in Munro 2007).

Munro (2007) stresses that this price revolution was a unique historical experience, because while inflation had been frequent in European economic history, this event was exceptional both in its persistence over a period of 130 years (ca. 1520 to ca. 1650), and in its international character, with price increases that spread all over Europe, and perhaps the world. England, for example, had a 6.8 fold price rise between 1511-15 and 1645-50, with coinage debasements adding their share.

Incidentally, the 16<sup>th</sup> century price revolution only supports half of Hume's thought experiment, namely, what happens if the stock of money expands tremendously. As to the other half, Friedman and Schwartz (1963) provide, in chapter 7 of what Rockoff (2000) calls an impressive array of case studies in monetary history, a landmark analysis of a crisis where the money supply contracted sharply, the Great Depression.<sup>12</sup>

#### **D. Realistic assumptions**

The use of empirical observations and historical material is a common thread in Hume's essays. Schabas (2008), p. 167, points out that money is only neutral in the hypothetical world of Hume's thought experiment, because his conceptual objective is to explain the behavior of the balance of trade; when Hume (1752) talks 'Of money', also published in the *Political Discourses*, the setting is much closer to the actual world. Like Hume, Rotwein (1957), p. cx, points to the abundant historical material in Smith's *Wealth of Nations*, although Rotwein finds a tendency to abstract from historical influences in the theoretical parts. After Adam Smith, Gide and Rist (1909), pp. 437-438, remark that

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<sup>12</sup> What Friedman and Schwartz (1963) call the "Great Contraction" is in the context of a convertible paper currency. Eichengreen (1992) studies how the limits the gold standard placed on monetary policy contributed to the Great Depression.

political economy suffered from an attack of anemia, since economic analysis, distilled of any historical content, concentrated on analyzing the theoretical consequences of a few key principles.<sup>13</sup>

In regard to the observational traits in Hume's theories, Hayek (1963) draws a broader consequence, linking Hume's close attention to history, and cultural evolution, to an evolutionary tradition within the Enlightenment which recognizes the narrow bounds of human understanding, developed most fully by Hume but shared by Smith among others –to which I would prominently add Montesquieu. Hayek contrasts this to another tradition that arrives at truth from explicit premises, rational constructivism, of which Bentham is an important example, preceded by Descartes, Leibniz, Bacon, Hobbes and Locke in the 17<sup>th</sup> century.

As to explicit premises, following Mills' insight that we all reason from assumptions, the relevant distinction between both traditions might rather be whether they rely or not on careful observation to formulate the hypotheses. Indeed, for Akerlof (2005) empirical examples allow to develop theories that recreate nature, instead of attempting to impose some pre-ordained order on it. Schabas (2008), p. 165, emphasizes Hume's propensity to provide empirical support for his theoretical claims. In this connection, she mentions Hume's dislike of the physiocrats, though this goes beyond their unrealistic assumptions, to their political absolutism. On this, more later.

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<sup>13</sup> For instance, in Ricardo's (1817), Chapter VII, elegant arithmetical example on the principles of comparative advantage, Portugal has absolute advantages over England both in the production of wine and textiles. England may still gain from trade by specializing in the production of textiles in which it has a comparative advantage; international trade basically boils down to barter, though Ricardo goes on to show how the specie-flow mechanism will redistribute the stock of money in monetary economies. Smith (1776), Book I, Chapter I, does not elaborate on the pure logic, but offers a more realistic illustration: Poland is less productive than England in both agriculture and in manufactures, and can only compete in the former because of England's greater superiority in the latter.

The nature of the assumptions is relevant for current controversies in economics. Friedman's (1953) main assertion is that theories must be solely tested by their predictions. But he adds that realistic assumptions are irrelevant, or even the wrong approach to building economic models, a statement that seems at odds with the nature of his own work. Mäki (2009) remarks that if assumptions really do not matter, rather than attacking Chamberlin for striving to use more realistic assumptions to build a monopolistic competition model, Friedman should appeal to the superior predictive performance of perfect competition models.<sup>14</sup>

For Akerlof (2005), realistic assumptions are important. As in Hume's general argument, Akerlof's approach to economic model-building is motivated by an empirical problem, that hypothesis testing in economics is close to impossible because of the looseness of the connection between theory and the specification of econometric tests. Given the difficulty of rejecting any null hypothesis, Akerlof argues for the incorporation of detailed information to build hypotheses using "our simple powers of observation", as well as the expertise of the trained economist that allows to connect mere anecdote and experience to economic structure.

By eliminating certain inconsistencies in Friedman (1953), Mäki also finds a realist interpretation of that text, linking it to a long tradition in economics that goes back to Mill and his contemporaries of viewing models as partial but potentially true descriptions of causally significant mechanisms. That view is implicit in Hume's economics.

## **E. Not "Perfect rationality only"**

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<sup>14</sup> Mäki (2009) goes on to say that, in the study of the used car market, it is neither irrelevant nor virtuous to ignore that information is asymmetric. On this, see Akerlof (1970).

Hume's narrow bounds of human understanding show in his specie-flow mechanism, through the process of gradual international adjustment to the law of one price (see Appendix).<sup>15</sup> This anticipates Cournot. When Cournot (1838) formalizes the assumption of self-interested individuals acting in markets as an optimization problem, that of maximizing profits, and extends it to game theory, as a problem of mutual best responses, the equilibrium is not discovered rationally but through trial and error.<sup>16</sup> For instance, a monopolist does not know the demand curve, but using the price-elasticity of demand, the optimum price can be discovered in a step-wise process by raising or lowering prices. Or when describing how agents arrive at a Cournot-Nash equilibrium in a duopoly, this is accomplished through a process now called best-response dynamics in evolutionary game theory (Gardner 1995, p. 225).

Most of modern economics has restricted the hypothesis of self-interest through the idea of *perfect* rationality, so economics has mainly become the study of rational choice, which Crespo (2009) characterizes as a “discipline-based” conception of economics that evolves after Lionel Robbins' definition of economics appears in 1935 as the study of how scarce means are allocated to alternative uses that are valued in themselves. Becker (1976) pioneers the application of this economic approach to human behavior.

Though incorrect as a description of human behavior, Myerson (1999), p. 1069, advances perfect rationality as: (i) the best analytical model available; (ii) an approximation of behavior in the long run when stakes are high; and (iii) the specific

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<sup>15</sup> For Samuelson (1980), p. 143, this “is vitiated by the fact that the same good must have the same price everywhere in a competitive world without transport costs,” i.e., in Samuelson's mathematical model.

<sup>16</sup> Just like Hume's adjustment mechanism, many economists consider Cournot's (1838) trial and error process non-sense. See the literature review in Leonard (1994).

contribution economists can make to social science, by analyzing the behavior of social institutions using the Nash equilibrium concept under the assumption that agents maximize their welfare.<sup>17</sup> One must leave to psychologists the questions of how to improve the education of individuals.

Others breathe more of life into economics. For example, Akerlof (1984) is against restricting the set of assumptions that are appropriate for good economic theory, since hypotheses drawn from psychology and social sciences may allow to develop interesting theories to explain economic issues. This is part of what Crespo (2009) calls a “field-based” conception of economics articulated by Coase (1978).

For Coase (1978), the enduring advantage economists have in relation to other social sciences is not in any technique or approach, but rather in an in-depth familiarity with their subject matter, the economy. Compared to the rational choice approach, this restricts the scope of economics, but it allows to widen the set of things that may be said of the economy, a conception that goes back to Smith, Mill and Marshall.

A fuller analysis of Hume’s views on the narrow bounds of human understanding would carry us beyond the thought experiment.<sup>18</sup> What is clear from Hume’s general argument is that it relies on an application of the hypothesis of self-interest in a setting of voluntary exchanges in markets, so as in Smith (1776) the consequences of self-interest depend on a specific institutional setup. More generally, in his essay “That politics may

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<sup>17</sup> For Myerson (1999), Cournot doesn’t see the implications of game-theoretic analysis for social science (see Leonard 1994 for an interesting range of views). The conventional wisdom associates Cournot to duopoly, or to firms that produce the same consumer good, spanning from monopoly to perfect competition, to which Myerson adds a model where two monopolists produce complementary inputs. Though Cournot develops the “Nash” concept in concrete applications to industrial organization (IO), he mentions an extension to strategic trade policy. And IO spearheaded applied game theory, e.g., Hotelling’s duopoly model, since Downs key for the analysis of democracy as a spatial voting model.

<sup>18</sup> Rotwein (1957) has a comprehensive discussion of Hume’s economic psychology and the importance of habit and custom in behavior.

be reduced to a science”, Hume (1741) asserts that in political systems subject to checks and balances, where institutional constraints provide specific incentives, “So great is the force of laws, and of particular forms of government, and so little dependence have they on the humours and tempers of men, that consequences almost as general and certain may sometimes be deduced from them, as any which the mathematical sciences afford us.” In absolute governments, on the other hand, the goodness of the administration depends entirely on the “character and conduct of the governors”.<sup>19</sup> Hayek (1967) places Hume’s view of rationality, provided by a set of rules that constrain behavior, within a broader evolutionary view in which institutions and traditions evolve spontaneously as the result of human actions but not of human design.

## **V. Conclusions**

Hume’s practice is ahead of his theory of an inductive method in empirical sciences. Instead of a long series of repeated experiences that allow to draw a fallible inference, he proceeds abductively. Hume joins the quantity theory of money with mercantilist notions to develop a powerful theory of the specie-flow mechanism, allowing him to derive, in the abstract, a set of necessary conclusions on an empirically contingent issue.

However, Hume is quite empirical in paying attention to the available facts, grounding his economic analysis on a paradigmatic event, the price revolution of the 16<sup>th</sup> century,

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<sup>19</sup> The physiocrats’ political absolutism separates rational constructivism from evolutionary views at a deeper level, the narrow bounds of human understanding. The physiocrats defend a strong government in hands of an illustrated despot in order to swiftly apply their pet economic reforms, dismissing Montesquieu’s system of checks and balances, shared by Hume, as conducive to a weak and ineffective government (cf. Hirschman 1976, part two). Unlike the physiocrats’ confidence in the ruler’s enlightened interest, as co-participant in national prosperity, for Montesquieu (1748) despotism does not guarantee the ruler’s best economic interests are served: even virtue needs limits (cf. also Streb and Druck 2007).

which backs (half) his explanation that seeks to address the contemporary fears about a wrong balance of trade. This specific case study helps to develop general insights about the workings of the economy.<sup>20</sup> It is paradoxical that Hume, one of the greatest empiricists in the history of philosophy, has as direct heirs Ricardo and the later classical economists, who are criticized by the Historical School in the 19th century *Methodenstreit* for using abstract deduction instead of induction based on observation (Gide and Rist 1909, Book IV, Chapter I). As to economic history itself, Cesarano (2006) notes how the move of new economic historians away from the analysis of specific episodes since the 1950s has reduced the role of economic history in economic theorizing, as regards suggesting new hypothesis and widening research perspectives.

Hume's abductive inference is a far cry from inductive methodologies that stress that the collection of data and more data is necessary before any progress in social sciences is possible. His general argument is a forerunner of our use of economic theory as a box of tools. But Hume takes into account the particulars of each problem, something that has led some commentators to speak of the inconsistencies of his monetary theory. To build good economic theory, one needs to tailor models to the relevant details of each case. Getting the assumptions right is, after all, crucial in a discipline like economics where we reason abductively.

### **Appendix: Hume's specie-flow mechanism in a small open economy**

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<sup>20</sup> Hicks (1967) remarks that monetary theory is historical because of its dependence on institutions. Great historical events, like the 16<sup>th</sup> century price revolution or the Great Depression of 1929, shape it as well.



Hypotheses (i)-(iii) are formalized here as equations (1)-(3). First, the trade balance  $NX$ , given by net exports, i.e., exports minus imports, affects the supply of money  $M$  with a one-period lag:

$$\Delta M_t = NX_{t-1} \quad (1)$$

Second, the competitiveness of the domestic economy, which depends on the relation between home prices  $P$  and international prices  $P^*$ , determines the trade balance  $NX$ . With a linear constant  $\theta > 0$ , the less competitive a country is, the smaller the net exports:

$$NX_t = -\theta(P_t - P^*) \quad (2)$$

Third, money supply equals money demand, which is given by the nominal volume of transactions, prices  $P$  time real transactions  $T$ , and a constant of proportionality  $k$ :

$$M_t = kP_t T \quad (3)$$

A few comments. If the effect of the balance of payment on money in equation (1) were simultaneous, instead of lagged, the law of one price would never be violated.<sup>21</sup> In equation (2), the assumption is that it is a small open economy that takes international

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<sup>21</sup> Instantaneous international adjustment helps explain why Adam Smith does not resort to Hume's specie-flow channel. Humphrey (1981) shows how Smith treats the economy as a small open price-taking economy where the law of one price always holds; if there is an excess supply of money, this is instantly corrected through direct spending (real balance) effects, as in the monetary approach to the balance of payments. Rotwein (1957), pp. lvi-lvii, mentions that Hume acknowledged this possibility to Oswald.

prices  $P^*$  as given, since Hume ignores the effects of domestic monetary changes on the world price level; all prices are quoted in specie, and there is no distinction between tradable and non-tradable goods. In equation (3), real domestic transactions  $T$  and the velocity of circulation  $1/k$  are taken as exogenous, so changes in the domestic money stock  $M$  affect prices  $P$ .<sup>22</sup>

We can now formalize the thought experiment. Let  $P_0 = P^*$ , so  $M_0 = kP^*T$ . Let the exogenous change in the quantity of money be  $\Delta M_1$ . By equation (3), an exogenous change in the quantity of money  $M$  affects prices  $P$ ,

$$\Delta P_t = \frac{1}{kT} \Delta M_t \quad (4)$$

By equation (2) this affects the trade balance  $NX$ ; given the lag in equation (1), it only comes back to affect the quantity of money through the trade balance the next period. This leads to the following difference equations for  $t \geq 2$ :

$$\Delta M_t = -\theta \left( P_0 + \sum_{i=1}^{t-1} \Delta P_i - P^* \right) = -\frac{\theta}{kT} \left( \sum_{i=1}^{t-1} \Delta M_i \right) \quad (5)$$

The money stock has the following trajectory for  $t \geq 1$ :

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<sup>22</sup> Rotwein (1957), p. lvi, notes that Hume recognizes that the velocity of circulation may not be a constant, for example if people decide to hoard the new specie.

$$M_t = M_0 + \sum_{i=1}^t \Delta M_i = M_0 + \Delta M_1 \left(1 - \frac{\theta}{kT}\right)^{t-1}. \quad (6)$$

Convergence requires  $|1 - \theta/(kT)| < 1$ ; with  $0 < \theta/(kT) < 1$ , convergence is monotonic. In the long run we have gone full circle: prices and the stock of money are back to the initial situation, and the trade balance is zero.

In continuous time, equations (1) and (2) lead to

$$\dot{M} = -\theta(P_t - P^*), \quad (7)$$

as in Berdell's (1995) first equation that follows Waterman's (1988) formulation.

Differentiation of equation (3) leads to the analogue of difference equation (4),

$$\dot{P} = \dot{M} / kT. \quad (8)$$

This formulation is a special case, when adjustment of money demand to supply is instantaneous, of Berdell's (1995) second equation that replicates Waterman (1988).

After a monetary shock  $M'_0$  raises prices, equations (7) and (8) imply that  $P(t) = P^* + e^{c - (\theta/kT)t}$ , where the constant depends on initial monetary conditions,  $c = \ln[(M'_0 / kT) - P^*]$ . Stability in continuous time requires  $\theta > 0$ , and convergence is always monotonic.

Berdell (1995) does not consider the special case of the specie-flow mechanism in "On the balance of trade", where there is instantaneous adjustment of domestic prices, but

rather the case where domestic prices adjust gradually, to combine it with the output and employment dynamics in “Of Money”. In “Of money”, Hume focuses on the real effects of money in the intermediate interval where money increases stimulate industry, and money decreases depress it (Fernández López 1998, chapter 13, describes Keynes as restricting his analysis in the 1936 *General Theory* to this Humean short run). Berdell (1995) finds that, with hysteresis in labor force participation rates, these real effects may be permanent.

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