
Volume 10

Issue 2 *Winter 2007: Symposium - Shaping a
New Direction for Law and Medicine: An
International Debate on Culture, Disaster,
Biotechnology and Public Health*

Article 2

October 2015

Telemedicine and the Commoditization of Medical Services

Thomas R. McLean

Follow this and additional works at: <https://via.library.depaul.edu/jhcl>

Recommended Citation

Thomas R. McLean, *Telemedicine and the Commoditization of Medical Services*, 10 DePaul J. Health Care L. 131 (2007)

Available at: <https://via.library.depaul.edu/jhcl/vol10/iss2/2>

This Article is brought to you for free and open access by the College of Law at Via Sapientiae. It has been accepted for inclusion in DePaul Journal of Health Care Law by an authorized editor of Via Sapientiae. For more information, please contact digitalservices@depaul.edu.

TELEMEDICINE AND THE COMMODITIZATION OF MEDICAL SERVICES

Thomas R. McLean, MD, JD, FACS, Esq.*

INTRODUCTION

Medicine is evolving rapidly. Telemedicine has destroyed the notion that healthcare services must be produced and consumed locally.¹ Elsewhere, the practice of medicine is being standardized by the adoption of both clinical guidelines and the techniques of Total Quality Management/Continuous Quality Improvement (hereafter TQM)² that are designed to eliminate provider variability.³ Already within the medical community discussion exists that physician services are

* CEO, Third Millennium Consultants, LLC, Shawnee, Kansas; Clinical Assistant Professor of Surgery, University of Kansas School of Medicine; Attending Surgeon at the Dwight D. Eisenhower Veterans Administration Medical Center, Leavenworth, Kansas. Address correspondence to Tom McLean at Third Millennium Consultants, LLC, 4970 Park, Shawnee, Kansas 66216, or via email at tmclean@dnamail.com. Nothing in this paper is to be construed as representing Veterans Administration policy or procedure. The author wishes to thank Marie Bismark, MD, JD for her suggestion that have improved the readability of this article.

¹ Thomas R. McLean & Edward P. Richards, *Teleradiology: A Case Study on the Economic and Legal Considerations in International Trade in Telemedicine*, 25 HEALTH AFF. 1378 (2006); Thomas R. McLean, *International Law, Telemedicine & Health Insurance: China as a Case Study*, 32 AM. J.L. & MED. 7 (2006) [hereinafter McLean, *China as a Case Study*]; Thomas R. McLean, *The Future of Telemedicine & Its Faustian Reliance on Regulatory Trade Barriers for Protection*, 18 HEALTH MATRIX 443 (2006) [hereinafter McLean, *Future of Telemedicine*]; Thomas R. McLean, *The Offshoring of American Medicine: Scope, Economic Issues, and Legal Liabilities*, 14 ANNALS HEALTH L. 205 (2005) [hereinafter McLean, *Offshoring of American Medicine*].

² Sid Sytsma, *Continuous Quality Improvement Vs. Business Process Reengineering - What Are the Differences?*, available at http://www.sytsma.com/cism700/CQI_TQM_BPR.html (on file with author). While there are some philosophic and technical differences between TQM and Continuous Quality Improvement, for the purpose of this article they are not material. *Id.* See also Thomas R. McLean, *ISO 9000 Is Coming: The Use and Discoverability of Hospital TQM Documents*, 13 J. CONTROVERSIAL MED. CLAIMS, 14 (2006).

³ Thomas R. McLean, *Medical Rationing: The Implicit Results of Leadership by Example*, 36 J. HEALTH L. 325 (2003); see also INSTITUTE OF MEDICINE, LEADERSHIP BY EXAMPLE (2004) (discussing the place of clinical guidelines in medicine and define medical quality by statistical methodology).

becoming fungible;⁴ a notion that is implicitly assumed by the Institute of Medicine (IOM) in its recommendations that America should make greater use of physician extenders.⁵ Finally, medicine is evolving because there is more volatility in the supply of physician services than ever before.⁶

How should this evolving market be organized? In other evolving and/or volatile sectors of the economy, commoditization of a market after the introduction of standardized futures contracts has proven beneficial.⁷ In the past, commoditization of health care would have been impossible because a close geographic and temporal relationship was necessary between providers and patients. But in a telemedical world, where providers may be separated from patients by miles and time zones, for the first time futures contracts for health care services are possible.

The purpose of this paper is to open discussion on the potential commoditization of medical services. Part II discusses the origin and operation of commodities exchanges to provide familiarity with futures and options contracts, which are the backbone of a commodities market. Part III discusses how telemedicine and standardized physician contracts allow for futures contracting in medical services. Finally, Part IV of this paper discusses how a telemedical exchange might be operated, as well as the advantages and disadvantages of such an exchange. This paper concludes that if the IOM is correct that the practice of medicine is like any other business,⁸ then nothing prevents

⁴ James Brice, *Thrall Weighs Pros and Cons of Radiology Outsourcing - U.S.-Trained Radiologists Overseas Pose Little Real Threat, but Residents Still Fear Loss of Jobs*, DIAGNOSTIC IMAGING, Jan. 7, 2005, at 10.

⁵ INSTITUTE OF MEDICINE, CROSSING THE QUALITY CHASM (2001); see also Thomas R. McLean, *Crossing The Quality Chasm: Autonomous Physician Extenders Will Necessitate a Shift to Enterprise Liability Coverage for Health Care Delivery*, 12 HEALTH MATRIX 239 (2002).

⁶ Thomas R. McLean, *Phantom Traffic in Cybersurgery* (2006) (unpublished manuscript, on file with author); Thomas R. McLean, *The 80-Hour Work Week: Why Physicians Work Time Restrictions Will Mean that More Health Care is Provided by Physician Extenders*, 26 J. LEGAL MED. 339 (2005) [hereinafter McLean, *80-Hour Work Week*].

⁷ Kurtis J. Ward, *The Futures Industry: From Commodities to the Over-the-Counter Derivatives Markets*, PIABA Bar Journal (Fall 2005) at 8-9, available at <http://www.kurtisward.com/pdf/piaba.pdf>;

BABSON-UNITED INVESTMENT ADVISORS, SUCCESSFUL INVESTING 152 (4th ed. 1987).

⁸ INSTITUTE OF MEDICINE, BUILDING A BETTER DELIVERY SYSTEM: A NEW ENGINEERING / HEALTH CARE PARTNERSHIP (2005) (making the assumption that because systems-engineering tools have been effective in other industry these tools will be effective in the health care field); INSTITUTE OF MEDICINE, TO ERR IS HUMAN:

the health care sector of the economy from evolving to a commodities market.

I. COMMODITIES MARKETS

A. The History of Commodities and Futures Trading

The history of commodities trading is just about as long as the history of man, and, until recently, was a history of agricultural markets.⁹ Perhaps the oldest reference to a commodities market is found in the Bible with the story of Joseph, who advised the Pharaoh of Egypt to store grain during the years of good harvest.¹⁰ Secular authority for the use of commodities markets dates from China¹¹ and Samaria¹² around 3000 B.C.E. The Greeks and Romans, however, were the first to operate markets with (1) fixed trading times, (2) fixed trading places, and (3) cash contracts for future deliveries.¹³

After the fall of Rome, in 476 C.E., the utilization of commodities-style exchanges waned because manors strove to be self-sufficient under the feudal system.¹⁴ Use of the commodities market lay dormant until the 12th century when crusaders returning home introduced the European world to “letters de faire” and “trade fairs.” Letters de faire were the forerunners of the modern futures contract, *i.e.*, delivery of the agricultural goods would occur some time after the actual sale.¹⁵ Trade fairs, introduced by the Counts of Champagne in 1114 C.E., brought together buyers and sellers at a particular time and place.¹⁶ When a dispute arose between a buyer and seller at a trade fair,

BUILDING A SAFER HEALTH SYSTEM (2000); *Cf.* In re Evanston Nw. Healthcare Corp., FTC Docket. 9315 (2005) (competitive dynamics of the U.S. health care markets are distinguishable from other markets); Republic Tobacco v. N. Atl. Trading, 381 F.3d 717, 738-39 (7th Cir. 2004) (same); Thomas R. McLean, *The Implication of Patient Safety Research & Risk Managed Care*, 26 S. ILL. U. L.J. 227 (2002) (same conclusion different reasoning).

⁹ Commodityworld.com, F.A.Q. – Frequently Asked Questions, <http://www.commodityworld.com/faq.htm> (last visited Oct. 9, 2006).

¹⁰ Ward, *supra* note 7, at 4. Gold, which after 1970 has been considered a commodity, was mentioned in the Book of Genesis. *Id.*

¹¹ Bruce Babcock, Commodity Futures Trading for Beginners, <http://www.rb-trading.com/begin4.html> (last visited Nov. 29, 2006).

¹² BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 147.

¹³ Ward, *supra* note 7, at 4-5.

¹⁴ *Id.* at 5.

¹⁵ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 148.

¹⁶ Ward, *supra* note 7, at 4-5.

the dispute was settled according to the law of merchants.¹⁷ The key principles behind the law of merchants were (1) bills of exchange were legally enforceable documents, and (2) other experienced merchants (and not the courts or judges) were to preside over disputes among traders.¹⁸ Over the next couple of hundred years merchant courts developed into the first modern exchanges.¹⁹

Organized forward contract trading first appeared in Japan in the 17th century.²⁰ Japanese merchants would store rice in warehouses and sell “rice tickets” to the general public.²¹ (Rice ticket trading was conducted under a set of rules similar to those that regulate exchanges today.²²) Rice tickets were actually forward contracts in which cash was exchanged for a future delivery of rice. Eventually, some rice tickets were sold with a “no delivery feature,” thereby creating a speculative rice futures market²³ and allowing rice tickets to become a *de facto* form of currency. Unfortunately for this early Japanese rice market, erratic price differences between the actual cash price for rice and the nominal value price of “no delivery” rice tickets developed. The resultant economic chaos required the Japanese Imperial Government to step in and curtail trade in rice tickets.²⁴

This discussion of rice tickets brings up an important point. In modern parlance, “commodities trading,” “forward trading,” and “futures trading” are often used synonymously and imprecisely.²⁵ Technically, “trading in a commodity” refers to the exchange of a named product (*e.g.*, agricultural goods, gold, or an exchange rate for currency) regardless of whether the exchange occurs in the present or at future. But with experience in trading commodities, traders realized that it was possible to separate the value of the commodity from the commodity itself, thereby allowing the value of goods to be sold separately from the good itself.²⁶ This subtle distinction would form

¹⁷ *Id.* (citing RICHARD J. TEWELES & FRANK J. JONES, *THE FUTURES GAME: WHO WINS, WHO LOSES, & WHY?* (3d ed. 1999)).

¹⁸ *Id.* (citing WILLIAM D. FALLOON, *MARKET MAKER: A SESQUICENTENNIAL LOOK AT THE CHICAGO BOARD OF TRADE* (1998)).

¹⁹ *Id.* The first modern exchange, the Royal Exchange, opened in London in 1750.

²⁰ *Id.*

²¹ *Id.*

²² BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 11.

²³ *Id.*

²⁴ Ward, *supra* note 7, at 6.

²⁵ *Id.*

²⁶ *Id.* at 2. “Today, the term ‘Commodities’ (although still in use) is slowly being replaced in favor to the more general and all-inclusive term, *Futures*.” *Id.*

²⁷ *Id.* at 8.

the basis for distinguishing forward and futures contracts.²⁷ A forward (or cash) contract for a good is created when a supplier agrees to accept cash in the present in exchange for future delivery.²⁸ In contrast, a futures contract does not contemplate actual delivery of the good as only the value of the contract is traded.²⁹ While this distinction has important legal ramifications, for the purposes of this article, the difference between forward and futures contracts is inconsequential, and these terms will be used interchangeably.³⁰

The first successful modern commodities exchange in the United States was the Chicago Board of Trade (CBOT).³¹ Formed in 1848 by a consortium of 84 merchants interested in freeing themselves from their dependency on eastern financial institutions,³² the CBOT specialized in agricultural forward contracts.³³ After the Civil War, the CBOT facilitated commodities trading with the introduction of standardized forward contracts. As explained below, use of standardized contracts means that only price and quantity remain to be negotiated at the time of trade.³⁴ After the Chicago Fire in 1871, the CBOT further facilitated trading by introducing the concept of the "clearinghouse,"³⁵ which virtually eliminated counterparty risk of non-performance.³⁶ The CBOT's elimination of counterparty risk and transparency of operation significantly reduced price volatility that occurred between the time of planting and harvesting.³⁷ Moreover, because the risk of harvest was transferred away from farmers, major lenders were more willing to invest capital in the agriculture industry

²⁷ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 148; PIET SERCU & RAMAN UPPAL, *INTERNATIONAL FINANCIAL MARKETS AND THE FIRM* (1995).

²⁸ *Id.* at 17.

²⁹ *Id.*; S.J. Chang, Introduction to Financial Futures from Myth to Truth, <http://iilt.ilstu.edu/sjchang/Derivatives/futures.ppt> (last visited Oct. 10, 2006).

³⁰ For example, the distinction between a futures and forward contract is important as to whether the contract is regulated under the Commodity Futures Modernization Act of 2000. See Commodity Futures Modernization Act of 2000, 7 U.S.C. § 1-25 (2006); Jayashree B. Gokhale, *Hedge to Arrive Contracts: Futures or Forwards*, 56 DRAKE L. REV. 55, 57 (2004).

³¹ Chicago Board of Trade, CBOT - Our History, <http://www.cbot.com/cbot/pub/page/0,3181,942,00.html> (last visited Oct. 10, 2006).

³² Ward, *supra* note 7, at 7.

³³ Chicago Board of Trade, *supra* note 31.

³⁴ *Id.*

³⁵ Ward, *supra* note 7, at 11.

³⁶ See discussion *infra* Part II, Section 2(b)(ii).

³⁷ Ward, *supra* note 7, at 9.

and technology.³⁸ These, and other, innovations in futures contracting developed by CBOT have been widely adopted by other exchanges and have stimulated unprecedented growth of the U.S. agricultural market.

Prior to the 1970s, commodities markets focused exclusively on trading in agricultural products. Two events of the 1970s, however, forever changed the nature of commodities trading. First, the fixed currency exchange system that was tied to the gold standard collapsed. After World War II, the values of the world's currencies were all linked to the value of gold under the Bretton Woods Agreement.³⁹ For example, the value of the dollar was set at 1/35 the value of an ounce of gold; foreign currencies were exchanged for dollars based on the value of that currency relative to the price of gold.⁴⁰ This system worked well for a time. The system's demise, however, was triggered by double-digit inflation that caused the number of dollars in circulation to skyrocket, while the known U.S. reserves of gold remain unchanged.⁴¹ To reconcile this disparity, in 1971, President Nixon closed the gold window.⁴²

Noble Prize winner Milton Friedman sought to capitalize on the closing of the gold window by speculating in gold.⁴³ Friedman soon discovered that only institutions, and not individuals, were allowed to buy gold from the banks.⁴⁴ Friedman's response to this closed market system was to convince the Chicago Mercantile Exchange (CME) to set up a futures market in gold trading for individuals. No longer would the price of gold be determined administratively according to the dictates of an international agreement; rather, it would be determined by individuals in the market.⁴⁵ In time, the CME's experience in gold futures trading paved the way for the CME to establish exchanges for other non-agricultural commodities (e.g., interest rates and stock

³⁸ *Id.*

³⁹ Christopher Mayer, *The Failure of Fixed Rates*, 24 THE FREE MARKET (Jan. 2004), available at http://www.mises.org/freemarket_detail.asp?control=471.

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ The Nobel Prize Internet Archive – Milton Friedman, <http://almaz.com/nobel/economics/1976a.html> (last visited Oct. 10, 2006) (in 1976 Milton Friedman won the Nobel Prize in Economics for “his achievements in the fields of consumption analysis, monetary history and theory and for his demonstration of the complexity of stabilization policy”).

⁴⁴ Ward, *supra* note 7, at 13.

⁴⁵ Chicago Mercantile Exchange, History of Futures, <http://www.cme.com/edu/course/intro/futrhist9696.html> (last visited Oct. 10, 2006).

indexes).⁴⁶ Still Later, other organizations would use the CME's model to trade in oil, silver, and copper futures.⁴⁷

The second event of the 1970s that changed the nature of commodities trading was the creation of the Chicago Board of Options Exchange (CBOE). Established in 1973, the CBOE specialized in trading standardized options contracts.⁴⁸ Options contracts come in two forms. A call option is the right, but not the obligation, to buy a futures contract (or in the case of the stock market, stock).⁴⁹ Thus, by purchasing a call option for 100 bushels of corn on a specific date for \$x dollars, the call-option holder has the right to buy those bushels for \$x in the future. If, on the delivery date, the market price for 100 bushels of corn is more than \$x dollars (such a contract is said to be "in the money"), the call option holder will exercise the option to buy the corn and then immediately sell the corn for a profit on the spot market.⁵⁰ On the other hand, if the option is at or below the spot market price, the call option contract holder will simply allow the option to expire unexercised. Approximately 80 percent of all call options contracts expire unexercised.⁵¹ The second type of option contract is a put option, which is the right to sell a specific quantity of a commodity at a specific price on a given day.⁵² While put options are

⁴⁶ *Id.*

⁴⁷ New York Mercantile Exchange, <http://www.nymex.com/index.aspx> (last visited Oct. 10, 2006).

⁴⁸ *Id.* However, the CBOE is not the exclusive exchange for trading options contracts. Options contracts play an important part in hedging strategies; see discussion *infra*, Part II(b)(iii). Accordingly, most exchanges that sell futures contracts will also sell options contracts; Gregory J. Millman, *Futures and Options Markets*, THE CONCISE ENCYCLOPEDIA OF ECONOMICS, <http://www.econlib.org/library/Enc/FuturesandOptionsMarkets.html> (last visited Oct. 6, 2006).

⁴⁹ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 135; Millman, *supra* note 48; Heather Moffit, *Do I Need a Hedge Account*, ONTARIO CORN PRODUCER, Feb. 2006, available at <http://www.ontariocorn.org/magazine/Issues/2006/02%20February/F2-0206.html>.

⁵⁰ Ward, *supra* note 7, at 15. Over the life of a future, the contract's value may not coincide with the spot (cash) market price. Chang, *supra* note 29. However, as the delivery date approaches, the contract's value "converges" with the spot market value. *Id.*; Chicago Mercantile Exchange, What are Futures?, <http://www.cme.com/edu/course/intro/whatfutr9695.html> (last visited Oct. 10, 2006).

⁵¹ Market Harmonics - Understanding Stock & Index Options, <http://www.market-harmonics.com/option2.htm> (last visited Oct. 10, 2006) [hereinafter Market Harmonics]; Ward, *supra* note 7, at 16-17; Moffit, *supra* note 49.

⁵² Ward, *supra* note 7, at 15.

not exactly the reverse of call options,⁵³ for the purposes of this article, a put option can be considered the converse of a call option.

Organized trading in options is important because it facilitates the shifting of risk out of a particular market and into the capital market.⁵⁴ Moreover, because of the limited liability of an options contract, these contracts are considered to be more desirable than futures contracts by speculators. The purchaser of a futures contract is liable for the face value of the contract. In contrast, under most circumstances, the maximum loss the purchaser of an option contract is exposed to is the cost of the contract, commission, and fees.⁵⁵ Freed from the potentially staggering losses associated with futures contracts, option contracts enticed many more speculators (and capital) to move into the commodities markets. This influx of capital and the evolution of options contracts into derivative trading led to an explosive expansion of both the commodities and capital markets during the 1990s.⁵⁶

B. Today's Market

The evolution of commodities trading since the 1970s has made it clear that: (1) commodities trading is no longer limited to agriculture products, and (2) commoditization of a market facilitates the expansion of that market by shifting risk out of the market. But has commodities trading developed to a point where it could be applied to a service like medicine? In the case of telemedicine, the short answer appears to be "yes." However, to understand why and how telemedicine could become a commodity, a greater understanding of (1) the nature of commodity contracts, (2) the operation of exchanges, (3) the purpose of hedging and speculation, and (4) the regulation of commodities markets

⁵³ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 141.

⁵⁴ Moffit *supra* note 49; CommodityWorld.com, *supra* note 9; Ward, *supra* note 7, at 31-32; *see also* Chang, *supra* note 29 (The "main purposes of futures trading are hedging and speculation." (emphasis in original).

⁵⁵ Ward, *supra* note 7, at 15.

⁵⁶ *Id.* at 2 (citing Russell Wasendorf, Sr. *Innovation Deserves More than 15 Minutes of Fame*, STOCKS, FUTURES AND OPTIONS MAGAZINE, June 2003 at 21). Although derivatives are mentioned here for completeness, a detailed discussion of the derivatives market is beyond the scope of this article. See FRANK PARTNOY, INFECTIOUS GREED (2003) [hereinafter PARTNOY, INFECTIOUS GREED]; FRANK PARTNOY, F.I.A.S.C.O. (1999) [hereinafter PARTNOY, F.I.A.S.C.O.] for a treatment of derivatives.

is needed.⁵⁷ Once this information is in place, the concept of a commodities “bank” will be examined as a working model for a telemedical bank.

1. Contracting in Commodities

Standardized contracting for goods and services was the key to allowing non-agricultural markets to be commoditized.⁵⁸ Futures contracts in many sectors of the economy are now standardized with respect to: (1) the trading unit (quantity being traded), (2) grade of the good or service, (3) delivery date, (4) restrictions on minimal and maximum price, (5) description of par delivery grade, (6) premiums and discounts for non-par delivery, (7) trading limits (the number of contracts that may change hands in a day), (8) position limits (the number of positions a trader may take), and (9) delivery points.⁵⁹ By standardizing futures contracts in this fashion only two terms – price and quantity – remain open for negotiation.⁶⁰

In general, a market is ready for commoditization if (1) standardized contracting allows for hedging, (2) there is volatility in the supply or demand of the good, and (3) the good is easily transported and perish-resistant.⁶¹ Thus, it is easy to see why some goods, like oil, have served as a foundation for a commodities market. However, no one is ever certain whether a good or a service can be successfully

⁵⁷ A detailed discussion on the mechanics of trading “put” and “call” option contracts is beyond the scope of this article. See BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7; Ward, *supra* note 7; PARTNOY, INFECTIOUS GREED, *supra* note 56; FRANK PARTNOY, F.I.A.S.C.O., *supra* note 56; Chicago Board of Trade, <http://www.cbot.com> (last visited Oct. 10, 2006); Chicago Mercantile Exchange, <http://www.cme.com> (last visited Oct. 10, 2006); Chicago Board of Options and Exchange, <http://www.cboe.com> (last visited Oct. 10, 2006) for a detailed description of commodities trading.

⁵⁸ Price stabilization is facilitated by commodities trading because risk is shifted outside the market. See discussion *supra* Part II, Sec. 1 (history of commodities) and *infra* Part II, Sec. 2(iii) (hedging and speculation).

⁵⁹ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 152.

⁶⁰ Par refers to the face value of a stock bond or other negotiable instrument or the amount at which it may be redeemed. No-par refers to a stock, bond, or negotiable instrument that has no value or was issued without value. Par has no correlation with the market value of a stock, bond, or other negotiable instrument. *Id.* at 151; Chicago Mercantile Exchange, *supra* note 45 (Options are similarly standardized in order to only leave open price and volume terms); BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 135-36.

⁶¹ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 152.

commoditized;⁶² some attempts to commoditize goods or services that appeared to meet the above criteria have failed spectacularly.⁶³

2. Exchanges and Clearing Houses

Commodities contracts are traded on exchanges. In the U.S., commodities exchanges are voluntary associations of individuals created to facilitate the buying and selling of specific goods.⁶⁴ Only individual members, and not organizations, are allowed to trade contracts on the exchange floor.⁶⁵ Exchange members also receive discounts on trade transactions and commission fees.⁶⁶

For the most part, trading in commodities has not substantially changed for hundreds of years. The principle difference between medieval and modern trading concerns how contracts are extinguished. In earlier times, exchange members extinguished commodities contracts by the exchange of money and delivery of the goods.⁶⁷ Today, only three percent of commodities are extinguished by the end-user taking delivery.⁶⁸ To avoid taking delivery, most current traders take offsetting positions for the delivery of the good. For example, in one trade, an exchange member may agree to sell 100 bushels of corn for delivery on March 15 for \$x and, in a separate transaction, that same trader may agree to buy 100 bushels of corn with a delivery date of March 15 for \$y. By using offsetting trades, the exchange member never takes actual delivery of the corn. In this scenario, if the actual values for the contracts are such that when $x > y$, then the exchange member makes money and, if $y > x$, the member loses money. Consequently, while a commodities contract is theoretically deliverable, for most of the life of the contract, the contract is “merely a bookkeeping entry.”⁶⁹

⁶² *Id.*

⁶³ BETHANY MCLEAN & PETER ELKIND, *THE SMARTEST GUYS IN THE ROOM: THE AMAZING RISE AND SCANDALOUS FALL OF ENRON* (2004) (noting that markets for electricity and water have nuances that have prevented them from being commoditized).

⁶⁴ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 149.

⁶⁵ *Id.*

⁶⁶ *Id.* at 149-50.

⁶⁷ These commodities transactions involved forward contracts. *See* discussion *supra* Part II.

⁶⁸ CommodityWorld.com, *supra* note 9. Modern commodities transactions principally involve futures contracts. *See* discussion *supra* Part II.

⁶⁹ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 151-52.

Understanding how traders make money is important because of the “counterparty risk” and the development of clearinghouses. Counterparty risk refers to the notion that if one party is faced with significant losses, that party may elect not to perform.⁷⁰ To illustrate counterparty risk, consider a situation where an exchange member has agreed to sell a particular commodity but the price has gone up substantially during the life of contract. This escalation in the contract’s value may induce the seller to sell to a second and higher bidder, rather than deliver the contract to the original buyer. In this scenario, the original buyer faces a counterparty risk of the seller’s non-performance in a rising market. Conversely, a seller would face a counterparty risk of the buyer’s non-performance in a falling market. Counterparty risk is perhaps the most underappreciated risk of commodity trading, and, if left unchecked, counterparty risk can disrupt the commodities market for a particular good.⁷¹ To eliminate counterparty risk, exchanges have established clearinghouses.⁷²

Created by exchanges to become “the buyer to all sellers and the seller to all buyers,” the primary purpose of the clearinghouse is to act as an insurer on contract performance.⁷³ In essence, in actual trading, while exchange members may agree to the price and quantity terms of the contract, rather than actually contracting with each other, the rules of the exchange dictate that the actual counterparty to every trade is the clearinghouse. At the end of the trading day, the clearinghouse matches all trades for buyers, sellers, prices, delivery dates, and quantities; unmatched pairs are returned to the parties for reconciliation.⁷⁴ If a party later fails to perform, the clearinghouse makes good on the trade and deals with the breaching member on its own terms.⁷⁵

⁷⁰ Ward, *supra* note 7, at 16.

⁷¹ *Id.*

⁷² *Commodities Futures Trading Comm’n v. Zelener*, 373 F.3d 861, 865 (2004).

⁷³ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 150. Clearinghouses also help to protect an exchange’s financial integrity through margin calls on the exchanges members. A margin call is a call from a broker to a customer (called a maintenance margin call) or from a clearinghouse to a clearing member (called a variation margin call) demanding the deposit of cash or marginable securities to satisfy the Regulation T requirements and the house maintenance requirement for the purchase or short sale of securities or to cover an adverse price movement. *Id.*; see also Millman, *supra* note 48.

⁷⁴ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 151.

⁷⁵ *Id.*

Taken together, clearinghouses and standardized contracts make the underlying good of a commodities trade fungible.⁷⁶ To a large degree, commodities markets eliminate price volatility precisely because they make goods fungible, thereby allowing traders to take offsetting positions.⁷⁷ As we shall see momentarily, the successful elimination of market volatility by making a good fungible through the use of standardized contracting and trading on an exchange was used successfully in the natural gas market.⁷⁸ But, understanding how the trading of a fungible good can eliminate market volatility through the use of offsetting commodities trades requires some insight into hedging and speculation.

3. Hedging, Speculation, and Benefits of Commodities Contracting

A hedger is someone who participates in the market as a buyer or seller⁷⁹ and seeks to trade in commodities contracts to maximize profit.⁸⁰ At first glance, for market participants to engage in hedging by taking an offsetting position to a futures position would appear to be a zero-sum game.⁸¹ However, taking offsetting positions is only a zero sum game with respect to the delivery of the underlying commodity and not the commodity's price.

To illustrate these points, consider a farmer who has just planted a field of wheat.⁸² At the moment of planting, the farmer faces significant risks from the vicissitudes of nature, including drought and flooding; both of which could significantly affect the delivery price of wheat. The farmer deals with this risk by entering into a forward contract that locks in the farmer's price for delivering wheat and transfers the risk of a *force majeure* to the counterparty. Now suppose that after entering into the futures contract, a drought occurs and the price of wheat skyrockets. In this situation, despite the farmer's labor

⁷⁶ Zelener, 373 F.3d at 865.

⁷⁷ *Id.*

⁷⁸ McLEAN & ELKIND, *supra* note 63, at 30-31.

⁷⁹ Moffit, *supra* note 49.

⁸⁰ CommodityWorld.com, *supra* note 9. Unlike a hedge contract, in a cash-forward contract the investor does not make an initial margin deposit or subsequent margin call. Ward, *supra* note 7, at 31-32.

⁸¹ In a zero-sum game, one player's winnings equal the other player's losses. Ward, *supra* note 7 at 24.

⁸² Moffit, *supra* note 49.

and knowledge of rising prices, the farmer is locked into the forward contract created at the time of planting and therefore can not benefit from the rising market in wheat.⁸³

One way this farmer could benefit from a rising market would have been through the purchase of an option contract to offset his or her position in the futures market. For example, at the time of planting, the farmer might enter into a forward contract for the delivery of 100 bushels of wheat in the fall for \$100/bushel. At the same time, the farmer might purchase a call option to purchase 100 bushel of wheat in mid-July for \$100/bushel as a hedge. If, during the first half of July, a bushel of wheat for fall delivery is trading at less than \$100/bushel (*i.e.*, the farmer's option contract is "out of the money"), the farmer will let the option contract go unused. On the other hand, if, during the first half of July, a bushel of wheat for fall delivery is trading at more than \$100/bushel (*i.e.*, the farmer's option contract is "in the money"), the farmer will execute the option and purchase the 100 bushels of wheat. The farmer will then resell the 100 bushel of wheat in the rising market for future delivery for a profit.

In contrast to hedging, there is speculation. A speculator is someone that is not directly involved in a commodities market, but attempts to profit from price swings.⁸⁴ Whereas the market participant who uses a commodities contract as a hedge exhibits a risk-avoiding mentality, the speculator who uses a commodities contract to become the counterparty to the hedger exhibits a risk-taking mentality.⁸⁵ In essence, speculation and hedging exist in a "yin-yang" relationship in which hedging transfers market risk away from market participants and onto speculators who accept the risk.⁸⁶ Without market speculators to accept risk, many hedges would not be possible. Moreover, while commodities speculation may resemble gambling because of the potential for fantastic wins and losses, speculation (unlike gambling) provides an important social good: the addition of liquidity to a market.⁸⁷ The more speculators that are enticed to enter the market, the better, because more speculators mean the market will have greater volume and liquidity so as to minimize price swings.⁸⁸

⁸³ Market Harmonics, *supra* note 51 (by "definition, hedging means taking a position opposite the one you have for purpose of protecting your investment").

⁸⁴ Ward, *supra* note 7, at 22-23.

⁸⁵ Chang, *supra* note 29. While the clearinghouse is the counterparty to the farmer's hedge, the clearinghouse will pass the risk of loss on to the speculator.

⁸⁶ Millman, *supra* note 48, at 3.

⁸⁷ *Id.* at 4.

⁸⁸ Ward, *supra* note 7, at 22-23.

4. Regulation of the Futures Market

Commodities markets require regulation. Although speculators are essential to a healthy commodities market, a speculator will not enter a market that does not appear to be operated above-board. Historically, because commodities trading involved the trading of contracts, exchanges were regulated by state governments.⁸⁹ In the 1880s, off-exchanges "bucket" shops began trading futures contracts.⁹⁰ Regulation of bucket shops soon proved problematic for the states as the states were required to balance the competing interests of the exchanges and the bucket shops.⁹¹ After the courts began to hand down opinions that favored the exchanges,⁹² political pressure was placed on the federal government to exercise more authority in the regulation of the commodities markets.⁹³ Using its power to tax, the government's first foray into the regulation of commodities was the Future Trading Act (FTA) of 1921.⁹⁴ After the Act was declared unconstitutional,⁹⁵ the FTA was essentially re-enacted by Congress the following year under Commerce Clause authority as the Grain Futures Act (GFA).⁹⁶ In 1936, the GFA was amended to produce the Commodities Exchange Act (CEA),⁹⁷ which, for the first time, expressed the government's interest in regulating all commodities contracts whether they were for forward or futures contracts.⁹⁸

Although, the CEA has been amended many times over the years (most recently under the Commodities Futures Modernization Act (CFMA)), the fundamentals of the Act have remained unchanged.⁹⁹ Under the current version of the CEA, a "commodity" is broadly

⁸⁹ Jake Keaveny, *An Analysis of the History of Futures Regulation and the Trend Toward Demutualization*, 70 BROOK. L. REV. 1419, 1424 (2005).

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² *See* Bd. Of Trade of the City of Chi. v. Christie Grain & Stock Co., 198 U.S. 236 (1901).

⁹³ Keaveny, *supra* note 89, at 1424.

⁹⁴ Future Trading Act of 1921, Pub. L. No. 67-66, 42 Stat. 187 (1921), *invalidated by* Hill v. Wallace, 259 U.S. 44 (1922).

⁹⁵ Hill, 259 U.S. at 68 (1922) (holding that taxation is an impermissible method for regulation).

⁹⁶ Grain Futures Act of 1922, Pub. L. No. 67-331, 42 Stat. 998 (1922) *amended by* Commodity Exchange Act, 7 U.S.C. §§ 1-27 (2006).

⁹⁷ Commodity Exchange Act 7 U.S.C. §§1-27 (2006).

⁹⁸ *Commodities Futures Trading Comm'n v. Co Petro Mktg. Group, Inc.*, 680 F.2d 573, 578 (1982).

⁹⁹ Gokhale, *supra* note 30, at 70.

defined to include a series of agricultural products and "all other goods and ... all *services*, rights, and interests in which contracts for future delivery are presently or in the future dealt in."¹⁰⁰ The 1974 amendments to the CEA expand the scope of the Act's coverage to include non-traditional commodities (like gold and oil) and to create the Commodity Futures Trading Commission (CFTC);¹⁰¹ other amendments extended the scope of the CEA to cover foreign commodities contracts.¹⁰² If a good or service is a commodity then the CFTC has exclusive jurisdiction over the transaction.¹⁰³

Similar to the Securities Exchange Commission (SEC), which regulates the stock market by prohibiting misrepresentations,¹⁰⁴ the CFTC polices the commodities market via the antifraud clause of the CEA.¹⁰⁵ Moreover, for a futures contract¹⁰⁶ to be legally traded, it must

¹⁰⁰ 7 U.S.C. § 1a(4) (2006) (emphasis added). The CEA however does not define futures or forward contracts. See *Commodities Futures Trading Comm'n v. Noble Metals Int'l*, 67 F.3d 766, 772 n.4 (9th Cir. 1995). The terms "futures contracts" and "cash forward contracts" remain terms of art. *Salomon Forex, Inc. v. Tauber*, 8 F.3d 966, 971 (4th Cir. 1993).

¹⁰¹ Under the CEA, oversight of commodities trade was given to the USDA. In addition to creating the CFTC, the 1974 amendments also made the CFTC an independent agency.

¹⁰² Commodity Futures Trading Commission, International Affairs, <http://www.cftc.gov/cftc/cftcinternational.htm#USAccessToForeignProducts> (last visited Oct. 20, 2006). Foreign commodities are given additional procedure safeguards. *Id.*

¹⁰³ 7 U.S.C. § 2(a)(1)(A) (2006).

¹⁰⁴ A.A. Sommers, *The Regulation of the Securities Market in the United States* (May 1983), *available at* http://www.sechistorical.org/collection/papers/1980/1983_0501_Sommer_Reg_US.pdf.

¹⁰⁵ 7 U.S.C. § 6(b) (2006) (it is unlawful for anyone connected with "any contract of sale of any commodity for future delivery made ... for or on behalf of any other person," to "cheat ... or attempt to cheat or defraud" any other person); *see also* 7 U.S.C. § 6(c)-(m) (2006) for prohibited transactions. Costly turf battles waged by the SEC and CFTC are negative byproducts of the fragmented regulation of financial products. See Stephen J. Choi, *Channeling Competition in the Global Securities Market*, 16 *TRANSNAT'L LAW.* 111, 115 (2002). This article states that the CFTC polices the commodities market but makes no mention of the antifraud clause of the CEA on this or subsequent pages. *Id.* See also *Howey v. Sec. & Exch. Comm'n*, 328 U.S. 293, 298-99 (1946) (defining a security as investment contract, so potentially futures contracts could be securities); *but see* *Sinva, Inc. v. Merrill, Lynch, Pierce, Fenner & Smith, Inc.*, 253 F. Supp. 359, 366 (S.D.N.Y. 1996) ("the element of future delivery does not transform a commodities contract into a securities contract").

¹⁰⁶ Technically, the CEA does not cover forward contracts which end in delivery but only futures contracts. 7 U.S.C. § 2(a)(1)(A) (2006); Tom W. Bell, *Gambling for the*

either be traded on a designated exchange or registered with the CFTC.¹⁰⁷ This system is less than ideal because, with a few notable exceptions, exchanges do not police their members nor does the CFTC very often muster the political will to enforce its regulations.¹⁰⁸

From a practical point of view, the CFTC's laissez-faire approach towards regulations of financial products is increasingly important. In a world where money moves across international borders without trouble, any country that excessively regulates a financial product (thereby increasing transactions costs) soon sees its financial sector move offshore.¹⁰⁹ Accordingly, it is not surprising that the CFMA amended the CFA to make it more flexible. Under the CFMA, the CFTC is allowed to make regulations for individual markets so that regulations of one commodity are not necessarily applicable to all commodities.¹¹⁰ The plus side of the CFMA is that its net effect was to significantly stimulate the growth of commodities trading.¹¹¹ Because much of this growth is actually in derivatives, and not futures contracts,¹¹² a detailed discussion of the CFMA is not needed here.¹¹³ However, the story of derivative trading is extricably linked with the now infamous corporation Enron.

5. Skilling's "Gas Bank"

The story of Enron's rise and fall is well known.¹¹⁴ There seems little question that Enron's Chairman Ken Lay and CEO Jeff Skilling put on dazzling spectacles to divert the attention of investors, thereby creating

Good, Trading for the Future: The Legality of Markets in Science Claims, 5 CHAP. L. REV. 159, 170-71 (2002). However, as mentioned elsewhere for the purpose of this paper the distinction between a forward and futures contract is not material.

¹⁰⁷ 7 U.S.C. § 6(a)(1) (2006).

¹⁰⁸ Keaveny, *supra* note 89, at 1430.

¹⁰⁹ Hon. Frank H. Easterbrook, *When Does Competition Improve Regulation?*, 52 EMORY L.J. 1297, 1301 (2003).

¹¹⁰ Keaveny, *supra* note 89, at 1437.

¹¹¹ *Id.*

¹¹² Ward, *supra* note 7, at 55. In theory, the CFMA 2000 expanded the CFA's authority to regulate the over the counter finance market (OTC) for derivatives. OTC refers to trading directly between two parties and is the opposite of exchange market trading, which always involves intermediaries. However, exceptions in the CFMA coverage leaves much of the OTC unregulated.

¹¹³ *But see* Keaveny, *supra* note 89.

¹¹⁴ MCLEAN & ELKIND, *supra* note 63.

knowledge asymmetries of the market.¹¹⁵ Moreover, for the purposes of this article it does not matter whether Enron failed like any ponzi scheme must fail,¹¹⁶ or whether Enron failed because of a liquidity crisis brought on by bad decisions to take on more debt.¹¹⁷ What matters is that Skilling was frequently the smartest guy in the room,¹¹⁸ and Skilling's most brilliant idea was the creation of a "gas bank."

As a consultant to Enron in the late 1990s, Skilling realized that the most significant issue facing natural gas vendors was the volatility of supply and demand.¹¹⁹ Compounding this issue was the fact that the sale of natural gas occurred subject to non-standardized long-term contracts in a poorly developed spot market.¹²⁰ Skilling realized that if he could convince buyers and sellers of natural gas to use standardized contracts, it would be possible to commoditize the market for natural gas.¹²¹ Once standardized delivery contracts were in widespread use, all that Skilling would need to provide was a "gas bank" to serve as a forum for contract trading. As Skilling envisioned the operation of a gas bank, Enron would not only function as the exchange for trading, but it would also act as a clearinghouse to eliminate the counterparty risk.¹²²

While few commentators would be willing to give a "thumbs up" to all of Enron's wheeling and dealing,¹²³ Skilling's gas bank seems to be a notable exception. At least for a time, Enron's gas bank added liquidity to the natural gas market, and the gas bank made the

¹¹⁵ David M. Boje, Terry R. Adler & Janice A. Black, *Theatrical Facades and Agents in a Synthesized Analysis from Enron Theatre: Implications to Transaction Costs and Agency Theories*, TAMARA: J. OF CRITICAL POSTMODERN ORGANIZATION SCI. (Jan. 2005).

¹¹⁶ MCLEAN & ELKIND, *supra* note 63.

¹¹⁷ Hon. Richard D. Cudahy & William D. Henderson, *From Insull To Enron: Corporate (Re)Regulation After the Rise and Fall of Two Energy Icons*, 26 ENERGY L.J. 35, 91 (2005).

¹¹⁸ MCLEAN & ELKIND, *supra* note 63.

¹¹⁹ *Id.* at 33.

¹²⁰ *Id.* at 33-34.

¹²¹ *Id.*

¹²² *Id.* at 34-36; Cudahy & Henderson, *supra* note 117, at 84.

¹²³ See Frank Partnoy, *Lessons from Enron, How Did Corporate and Securities Law Fail? A Revisionist View of Enron and the Sudden Death of "May,"* 48 VILL. L. REV. 1245 (2003) (discussing how Enron's collapse had more to do with its stealth and its decisions to use special purpose entities and derivatives to hide debt).

market operate more efficiently.¹²⁴ The success of Skilling's gas bank in producing a laudable social outcome leads to the question: could an industry like medicine that is built on non-standardized practices and service contracts benefit from being commoditized? In the past, such an idea was laughable. Medical services had to be produced and consumed locally, and, as a result there was no way for medical services to be delivered under a futures contract. But in a telemedical world, as we shall see, futures contracts for medical services are no longer a laughable idea.

II. MEDICAL STANDARDIZATION, VOLITILITY, AND TELEMEDICINE

Recall that, in general, the aspects that characterize successful commodities markets include: (1) standardized contracts, (2) volatility in the supply or demand of the good, and (3) the good should be easily transported. These aspects exist or soon will exist in clinical telemedicine.¹²⁵

A. Standardization of Physician Contracts

Of the nine factors that must be controlled to standardize a telemedical futures contract,¹²⁶ six of these factors are easily controlled by a consensus decision-making process. Three factors involving contract specifics – the unit of trade, delivery dates, and the delivery points – can all be agreed upon as the market matures. For example, the unit of trade for surgical services may be ten cybersurgical operations that are to be delivered during a particular week to Mayo Clinic or perhaps Johns Hopkins University.¹²⁷ Alternatively, the unit of trade for radiology services may be the interpretation of 100 x-rays per day that

¹²⁴ Cudahy & Henderson, *supra* note 117, at 85; Christopher L. Culp, Corporate Aftershock: How Did We Get Here?, Presentation at the GSB Business Book Roundtable, Gleacher (April 29, 2004), at 7.

¹²⁵ BABSON-UNITED INVESTMENT ADVISORS, *supra* note 7, at 152; *see* discussion *infra*, Part IV for an explanation of how standardized contracts can be used for hedging. Part III demonstrates how medical services contracting will soon be ripe for forward contracting.

¹²⁶ *See* discussion *supra*, Part II(b)(i).

¹²⁷ Mayo Clinic and Johns Hopkins University likely have the most advanced and aggressively marketed telemedicine programs in the United States. *See* McLean, *China as a Case Study*, *supra* note 1.

are to be delivered to a clinic in Sydney.¹²⁸ Similarly, the three factors concerned with the efficient operation of the exchange – restrictions on minimum and maximum price, limits on the number of trading units changing hands in a day, and limits on trader positions – are resolvable through consensus decision-making. Again, the field of telemedicine is not yet sufficiently developed for these factors to be determined in this paper, but the process of determination is clear.

On the other hand, three of the remaining nine factors – grade of the good, description of par delivery grade, and premiums and discounts for non-par delivery – have heretofore kept traditional medical services from being commoditized. Common to these three factors is the notion of defining what is meant by “medical quality.” Although substandard medical care was recognized in Ancient Babylon,¹²⁹ the modern concept of medical malpractice was not articulated until the 18th century by Sir William Blackstone in his *Commentaries on the Laws of England*.¹³⁰ In America, only in the mid-19th century, when sufficient numbers of untrained “quack” physicians first started to appear did the states seriously begin to regulate the practice of medicine.¹³¹ This long regulatory gap between recognition and regulation of substandard medical care can be traced to two factors: (1) the inability to causally link a physician’s actions with the harm done to a patient, and (2) the lack of a workable definition of the standard of care.

Absent a scientific basis for disease, separating physician negligence from the course of disease, or expected complications of surgery, is difficult. So, while major surgical inventions date from Ancient Egyptians,¹³² it was not until after 1890 when Robert Koch

¹²⁸ Once a digital telemedical signal has been sent to a location like Sydney, nothing prevents that signal from being redirected to another location. See McLean, *Future of Telemedicine*, *supra* note 1.

¹²⁹ See The Code of Hammurabi, <http://www.lawresearchservices.com/admin/CodeHam.htm> (last visited Oct. 20, 2006) (the code’s eye-for-eye philosophy made the practice of surgery risky business).

¹³⁰ Richard M. Friedenberg, *Malpractice Reform*, 231 *RADIOLOGY* 3, 3-6 (2004).

¹³¹ McLean, *supra* note 5.

¹³² Virginia Morell, *The Pyramid Builders*, NATIONAL GEOGRAPHIC ONLINE EXTRA, Nov. 2001, http://www7.nationalgeographic.com/ngm/data/2001/11/01/html/ft_20011101.5.fulltext.html (describing a crush injury to the hand of a pyramid builder that was treated with a below-the-elbow amputation).

articulated the principles of bacterial infections¹³³ and after 1928 when Alexander Fleming discovered penicillin¹³⁴ that it became clear that infection was not an inevitable outcome of surgical intervention.¹³⁵ Unfortunately, the causal linkage between a physician's conduct and adverse outcomes is still not enough to define quality in practical terms. Thus, for most of the 20th century, a definition for quality in medical care remained enigmatic and, even today, when a legalistic definition is used, most negligent events go unreported.¹³⁶

A more practical definition of substandard medical care has proven elusive for many years because of the idiosyncratic nature of medicine. Because each physician asserts professional autonomy when prescribing medical care, reaching a consensus conclusion on what constitutes the standard of care provide is challenging at best. The absence of consensus on the appropriate standard of care allows very few medical practices to be considered entirely right or wrong. Of course, such idiosyncrasies lead to high levels of variability in the practice of medicine, and over-prescription does not necessarily lead to better care.¹³⁷ In addition, the lack of consensus serves to conceal the extent to which physicians exercise suboptimal clinical acumen in their management of patients.

For example, the medical community's failure to routinely apply known scientific principles to patient care translates to a 20 percent incidence of misdiagnosis -- a figure that has remained

¹³³ MedicineNet.com, Definition of Koch's Postulates, <http://www.medterms.com/script/main/art.asp?articlekey=7105> (last visited Oct. 20, 2006).

¹³⁴ David Ho, *Time 100: Alexander Fleming*, TIME.COM, Mar. 29, 1999, <http://www.time.com/time/time100/scientist/profile/fleming.html>.

¹³⁵ Jason T. Miller, Scott Y. Rahimi, & Mark Lee, *History of Infection Control and its Contributions to the Development and Success of Brain Tumor Operations*, 18 NEUROSURGICAL FOCUS 1 (Apr. 2005), available at <http://www.aans.org/education/journal/neurosurgical/apr05/18-4-4.pdf> (as late as 1887 the infection rate associated with an amputation was almost 100%).

¹³⁶ Eric J. Thomas et al., *Incidence and Types of Adverse Events and Negligent Care in Utah and Colorado*, 38 MEDICAL CARE 261 (2000).

¹³⁷ Katherine Baicker & Amitabh Chandra, *Medicare Spending, the Physician Workforce, and Beneficiaries' Quality of Care*, 23 HEALTH AFFAIRS, (Web Exclusives Jan.-June 2004) 184 (2004); Elizabeth S. Fisher et al., *Implications for Regional Variations in Medicare Spending, Part 2: Health Outcomes and Satisfaction with Care*, 138 ANN. INT. MED. 288 (2003); John E. Wennberg, *The More Things Change...: The Federal Government's Role in the Evaluative Sciences*, 22 HEALTH AFFAIRS (2003 Supplement) 308 (2003); Richard Pérez-Peña, *Few New York Hospitals Cited Among Best in Death-Risk Study*, N.Y. TIMES Feb. 6, 2006, at B2 (even in a city, the hospitals' results vary with their geographic location).

unchanged for 70 years.¹³⁸ The origin of misdiagnosis in treatment is sometimes due a physician's lack of knowledge. More often, however, misdiagnosis can be traced to the financial incentives given to physicians.¹³⁹ Additionally, there is fear within the medical community that criticism of a brethren physician regarding misdiagnosis will lead to ostracism.¹⁴⁰ In the law, variable prescriptions of medical treatment by physicians means that medical experts have to battle for credibility in medical malpractice actions in order to persuade juries as to the appropriate standard of care.¹⁴¹

Medical inflation, however, has changed our views of physician autonomy. Prior to the 1980s, society tolerated variability in the practice of medicine. The advent of double-digit inflation,¹⁴² which would eventually drive the cost of health care in America to its current figure of \$2 trillion dollars in 2006,¹⁴³ triggered a re-thinking of the incentives given to physicians. At first, America attempted to mitigate medical inflation by shifting health insurance from indemnity to

¹³⁸ David Leonhard, *Why Doctors So Often Get it Wrong*, N.Y. TIMES, Feb. 22, 2006, at C1.

¹³⁹ Thomas R. McLean & Edward P. Richards, *Managed Care Liability for Breach of Fiduciary Duty After Pegram v. Herdrich: The End of ERISA Preemption for State Law Liability for Medical Care Decision-Making*, 53 U. FLA. L. REV. 1 (2001); Edward P. Richards & Thomas R. McLean, *A Multidimensional Analysis of New Trends in Liability and Business Risk*, 18 J. LEGAL MED. 443 (1997).

¹⁴⁰ Sandra G. Boodman & Patricia Davis, *Va. Doctor's Misconduct Left Trail of Broken Lives*, WASH. POST, Sept. 28, 2003, at A01 ("[s]ome physicians fear that blowing the whistle on a colleague will brand them as traitors and subject them to ostracism and retaliation").

¹⁴¹ Stephanie Mencimer, *The White Wall*, LEGAL AFFAIRS, Mar.-Apr. 2004, available at http://www.legalaffairs.org/issues/March-April-2004/story_mencimer_marpar04.msp.

¹⁴² McLean & Richards, *supra* note 139. At present and for the foreseeable future, double-digit medical inflation is expected. Christine Borger et al., *Health Spending Projections Through 2015: Changes on the Horizon*, 25 HEALTH AFFAIRS (Web Exclusives Supplement) w61 (2006).

¹⁴³ Henry Aaron, Editorial, *A Health Care Prescription That's Hard to Swallow*, L.A. TIMES, Jan. 30, 2006, at B11. Excessive health care hurts the American economy because health care benefits are uniquely tied to the U.S. corporate world. So, as health care costs rise, American goods and services sell at a disadvantage on the global market. MICHELINE MAYNARD, *THE END OF DETROIT: HOW THE BIG THREE LOST THEIR GRIP ON THE AMERICAN CAR MARKET* 17 (2004) (General Motors must add \$1200 to the price of its cars to cover the health and pension benefits of its past and present employees). Ultimately, increasing health care costs are negatively impacting America's major manufacturers. Greg Burns, *Health-care Costs Targeted as Cure for Corporate Ills*, CHI. TRIB. May 7, 2005, at C1; Rick Popely, *GM, Ford Bonds Are Driven to Junk Yard*, CHI. TRIB. May 6, 2005, at C1..

managed care policies. Unfortunately, the shortcomings of giving physicians incentives not to treat patients under managed care became all too apparent.¹⁴⁴ A backlash against managed care products soon followed when these products failed to control medical inflation.¹⁴⁵ The Clinton Administration attempted to deal with both the managed care backlash and medical escalation by proposing the Health Security Act of 1993.¹⁴⁶ Although this Act died for multiple reasons, most of the measures advocated in this legislation are now coming to fruition under the patient safety movement.¹⁴⁷

Launched by the IOM's publication of *To Err is Human*, which reported that 98,000 hospitalized Americans die each year from iatrogenic errors,¹⁴⁸ the patient safety movement has matured to the point where it is virtually impossible to go more than a few days without the media reporting on a patient death due to medical error. Additionally, *To Err is Human* introduced the public to three concepts, namely that (1) the practice of medicine is highly variable (*i.e.*, idiosyncratic), (2) the more variability in a system, the more error-prone the system becomes, and (3) remedial care to treat medical errors is expensive.¹⁴⁹ Two years after the publication of *To Err is Human*, the IOM opined that the "American health care delivery system is in need of fundamental change"¹⁵⁰ to make it "affordable."¹⁵¹

Since the publication of *To Err is Human*, the IOM has published more than 250 monographs detailing how to fundamentally

¹⁴⁴ McLean & Richards, *supra* note 139; Richards & McLean, *supra* note 139.

¹⁴⁵ Alice A. Noble & Troyen A. Brennan, *The Stages of Managed Care Regulation: Developing Better Rules*, 24 J. HEALTH POL., POL'Y & LAW 1275 (1999).

¹⁴⁶ See D.M. Peterson & H.J. Brownawell, *A Review of the Health Security Act of 1993*, 48 HEALTH FIN. MGMT. 44 (1994).

¹⁴⁷ Thomas R. McLean, *Application of Administrative Law to Health Care Reform: The Real Politik of Crossing the Quality Chasm*, 16 J.L. & HEALTH 65 (2002). The Health Security Act (HSA) envisioned competing integrated systems for health care delivery where quality is determined by guidelines and statistical variation. *Id.* The control of intergraded delivery systems (IDSs) was perhaps the biggest difference between health care delivery under the HSA and the system of health care delivery that is taking shape under the patient safety movement. Under the HSA, health insurers would control the IDSs; whereas under the patient safety movement, IDSs would be controlled by the market.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 1-14.

¹⁵⁰ INSTITUTE OF MEDICINE, *supra* note 5, at 1.

¹⁵¹ McLean, *supra* note 5, at 241. Even a cursory reading of *To Err is Human* or *Crossing the Quality Chasm* demonstrates that the Institute of Medicine spends as much time discussing health care costs and financing as it does medical errors.

change our health delivery system.¹⁵² Of these publications, *Leadership by Example* provides the keys to understanding how contracting for medical care is to be standardized and quality is to be defined.¹⁵³ For the IOM, the first fundamental reform of medicine should be the introduction of objective standards, *i.e.*, clinical guidelines.¹⁵⁴ The primary value of a clinical guideline is that it provides an objective yardstick by which to measure a physician's performance. If the physician fails to deliver a service according to the guidelines, the physician has committed an error. For example, if a clinical guideline directs a physician to treat a ten-year old child with a fever and sore throat with penicillin, but the physician actually prescribes the more expensive antibiotic gorillacillin, then the physician has erred.¹⁵⁵ Importantly, guidelines will substantially curtail the idiosyncratic practice of medicine, which is the most important impediment to controlling medical inflation.¹⁵⁶ Also, by introducing objective clinical guidelines into the practice of medicine by 2008,¹⁵⁷ the government and business community will take a giant step towards laying the foundation for standardizing the practice of medicine.¹⁵⁸

¹⁵² Robert M. Wachter, *The End of The Beginning: Patient Safety Five Years After 'To Err Is Human,'* 23 HEALTH AFFAIRS (Jul.-Dec. 2004 Supplement) 534 (2004).

¹⁵³ INSTITUTE OF MEDICINE, *supra* note 3, at 1-4; McLean, *supra* note 3. For simplicity, this article only discusses the position and recommendations of the IOM. However, the IOM is by no means the only voice. Virtually the same recommendations and positions are being advocated by the National Quality Forum and the Centers for Medicare and Medicaid.

¹⁵⁴ INSTITUTE OF MEDICINE, *supra* note 3, at 8. *See also* McLean, *supra* note 8 (discussing how guidelines are developed); Robert Pear, *A.M.A. to Develop Measure of Quality of Medical Care*, N.Y. TIMES, Feb. 21, 2006, at A12.

¹⁵⁵ As used here, "gorillacillin" could be any antibiotic. Physicians may substitute a more expensive gorillacillin drug for penicillin and tell a patient (truthfully) that the drug is as good as penicillin. At the same time, the physician may accept a kickback or some other quasi-legal remuneration from gorillacillin's manufacturer. While helping pharmaceutical companies' bottomlines, these practices fuel medical inflation.

¹⁵⁶ ANTHONY R. KOVNER & JAMES R. KNICKMAN, *HEALTH CARE DELIVERY IN THE UNITED STATES* (Anthony R. Kovner et al. eds., 2005); *see also* Bruce L. Hall et al., *Evaluating Individual Surgeons Based on Total Hospital Cost: Evidence for Variation in Both Total Cost and Volatility of Cost*, 202 J. AM. COLL. SURGEONS 565 (2006).

¹⁵⁷ INSTITUTE OF MEDICINE, *supra* note 3, at 11.

¹⁵⁸ McLean, *supra* note 3, at 328-29.

But, guidelines alone will not eliminate variability in patient treatment.¹⁵⁹ For example, even where clear cut guidelines already exist, physicians will ignore the guidelines 50 percent of the time and treat the patient according to the physician's idiosyncratic whim.¹⁶⁰ To improve physician compliance, the IOM has recommended that a conceptual framework is needed to analyze physician performance.¹⁶¹ Although the IOM has never explicitly stated the nature of this conceptual framework, circumstantial evidence suggests that the IOM envisions some form of TQM such as Six-Sigma.¹⁶² While other TQM disciplines exist,¹⁶³ Six-Sigma, as developed by Motorola¹⁶⁴ and later

¹⁵⁹ The discussion of guideline analysis herein has been how simplified performance standards, and not guideline compliance, are measured. Performance standards are "management-approved expression of the performance threshold(s), requirement(s), or expectation(s) that must be met to be appraised at a particular level of performance." *Developing Performance Standards*, Workforce Performance Newsletter Reprint (U.S. Office of Personnel Management), April 1998, available at <http://www.opm.gov/perform/articles/118.asp>. In general performance measurements should be "objective, measurable, realistic, and stated clearly." *Id.* However, a detailed discussion on setting and measuring performance standards is beyond the scope of this article.

¹⁶⁰ Elizabeth A. McGlynn et al., *The Quality of Health Care Delivered to Adults in the United States*, 348 NEW ENG. J. MED. 2635 (2003).

¹⁶¹ INSTITUTE OF MEDICINE, *supra* note 3, at 18; cf. INSTITUTE OF MEDICINE, *supra* note 8 (making the assumption that because systems-engineering tools have been effective in other industries they will be effective in the field of health care).

¹⁶² McLean, *supra* note 3, at 330; see also Carolyn Clancy, Director of the Agency for Healthcare Research and Quality (AHRQ), The Quality Challenge, Address to Health Care Quality Summit – Improving Health care for All Americans (Apr. 4, 2005) available at <http://www.ahrq.gov/QUAL/qsummit/qsummit1.htm> (citing two reports, The Second Annual National Health Care Quality Report and the National Health Care Disparities Report, which were both issued in February 2005 and concern the terms of statistical compliance with clinical guidelines). See National Healthcare Quality Report 2004, <http://www.qualitytools.ahrq.gov/qualityreport/browse/browse.aspx> (last visited Nov. 30, 2006); National Health Care Disparities Report, <http://www.qualitytools.ahrq.gov/disparitiesreport/browse/browse.aspx> (last visited Nov. 30, 2006).

¹⁶³ See David Simmons, *Examining ISO 9000 in Health Care*, QUALITY DIGEST, Mar. 1998, available at <http://www.qualitydigest.com/mar98/html/cover.html>; Press Release, National Institute of Standards and Technology, Baldrige Award Recipient Profile, SSM Health Care -- Leading the Way, available at http://www.nist.gov/public_affairs/releases/ssmhealth.htm (last visited Sept. 23, 2006). Both are illustrative of health care TQM systems.

¹⁶⁴ Mark Chassin, *Is Health Care Ready for Six Sigma Quality?*, 76 MILBANK Q 565, 577 (1998).

refined and championed by General Electric,¹⁶⁵ is a leading candidate for a medical TQM system. As currently used in the industrial sector, Six-Sigma defines quality as a methodology that generates no more than 3.5 errors per million products produced.¹⁶⁶ Any worker, division, or company that exceeds this threshold needs attention.¹⁶⁷

Notice that if clinical guidelines and a system of TQM were applied to medicine, the determination of medical quality would no longer need to be determined by the idiosyncrasies of physicians. Guidelines would provide a bright-line test for determining the standard of care. Either the provider complied with the guidelines or did not. Similarly, if medical quality was defined statistically to be an error rate of no more than three percent, non-physicians could determine whether a medical grade of quality was being delivered by a provider. Moreover, as TQM is serially applied to a process over a long period of time, the variation in the procedures and outcomes diminish.¹⁶⁸ Accordingly, if a system of TQM is used to analyze physician performance, one would expect that physician performance would become more fungible.

With a definition of medical quality in place, a major impediment to turning medical services into a commodity is removed.¹⁶⁹ Still, more than a definition of medical quality will be needed in order for health care to be delivered as a commodity. For medicine to become a commodity physicians will need to be given appropriate incentives and there must be a surveillance or enforcement mechanism for determining medical quality. Absent both of these features, the medical community will ignore any notion of medical

¹⁶⁵ Lynley Browning, *Business; M.B.A. Programs Now Screen for Integrity, Too*, N.Y. TIMES, Sept. 15, 2002, § 3, at 4; JACK WELCH & JOHN A. BYRNE, JACK: STRAIGHT FROM THE GUT (2001).

¹⁶⁶ Andrea Gabor, *Quality Revival, Part 2: Ford Embraces Six Sigma*, N.Y. TIMES, June 13, 2001, at C5.

¹⁶⁷ More detailed discussion on the application of the Six-Sigma to the health care workplace can be found at Chassin, *supra* note 164; McLean, *supra* note 3.

¹⁶⁸ P.W. Haserot, *What 'Quality' Means, Beyond All the Buzzwords*, NAT'L L.J., Sept. 21, 1992. More generally, TQM disciplines are iterant systems predicated on the notion of regression to the mean that are designed to eliminate variations. David H. Thornley, Regression to the Mean, <http://www.visi.com/~thornley/david/philosophy/thinking/mean.html> (last visited Nov. 30, 2006).

¹⁶⁹ See discussion *supra* in this section. A discussion of one impediment to the commoditization of medical services, handling the delivery of non-conforming goods or services, has been omitted. This concern, however, should be able to be handled contractually in a mature commodities market.

quality and continue to practice in an idiosyncratic manner. Anticipating these issues, the IOM has recommended that the method for purchasing medical services be fundamentally changed.¹⁷⁰ More specifically, the IOM has proposed that services be selected on a value-based purchasing system characterized by: “(1) disclosure of comparative quality information to encourage consumers and purchasers to choose the highest-quality providers, and (2) selective purchasing or payment incentives to providers and beneficiaries.”¹⁷¹ While a discussion of public disclosure of medical quality is beyond the scope of this article, the selective purchasing of medical services so as to reward provider behavior has become known as pay-for-performance (P4P) reimbursement.

While details concerning physicians’ P4P programs remain sketchy,¹⁷² presumably these programs will resemble those in existence for hospitals.¹⁷³ Currently, the Centers for Medicare and Medicaid’s P4P program rewards hospitals by providing that those “scoring in the top 10% for a given set of quality measures will receive a 2% bonus payment on top of the standard DRG payment for the relevant discharges.”¹⁷⁴ P4P programs, however, involve more than bonuses as they contemplate both a “carrot and a stick” approach. Not surprisingly, little has been publicly discussed about the dark side of P4P for hospitals or physicians. Presumably a provider who consistently provides medical services with an excessive error rate and/or scores in the bottom ten percent of a TQM-based assessment of medical quality will be forced out of business¹⁷⁵ (i.e., public reporting of medical errors

¹⁷⁰ INSTITUTE OF MEDICINE, *supra* note 3, at 1-4.

¹⁷¹ *Study: Doctors Snub Guidelines on Drugs*, CHI TRIB. Apr. 21, 2004, at C19.

¹⁷² AMERICAN MEDICAL ASSOCIATION, PAY FOR PERFORMANCE (P4P) INITIATIVES (2004), available at http://www.wsma.org/memresources/p4p_revised_wc2.pdf; Press Release, Bridges to Excellence, Physicians, Business, Government & Industry Embrace Common Strategy To Improve Health Care: Pay-For-Performance available at http://www.bridgestoexcellence.org/news/pr_7.htm.

¹⁷³ Medicare Modernization Act, Pub. L. No. 108-173 §501 (2003).

¹⁷⁴ Press Release, Centers for Medicare & Medicaid Services, Medicare “Pay for Performance (P4P)” Initiatives (Jan. 31, 2005) available at <http://www.cms.hhs.gov/apps/media/press/release.asp?Counter=1343>.

¹⁷⁵ Thomas R. McLean, *Using the Market to Regulate Health Care Price: Why Heart Hospitals Will Have a Competitive Advantage in the World of Post-Diagnostic Related Group Pricing*, 2 AM. HEART HOSP. J. 165 (2004) (providers who turn in suboptimal quality numbers will be forced out of business); Robert A. Guyton, *Quo Vadimus?*, 78 ANNALS THORACIC SURGERY 391 (2004) (suggesting that the carrot-and-stick approach to provider health care may even be applied in real-time); Cf. David Oliver Weber, *The Dark Side of P4P*, THE PHYSICIAN EXECUTIVE, Nov.-Dec.

will insure that suboptimal providers become notorious). Yet, while P4P reimbursement will make some providers winners and some losers, most commentators believe that P4P reimbursement is inevitable.¹⁷⁶

In short, unless something radically undermines the patient safety movement, in a few years it is likely that we will have a workable definition of medical quality. At that point, it will be possible to write standardized futures contracts for telemedical services. Providers will agree to deliver a set volume of medical services with a medical grade of quality to a particular location for a fixed fee. Yet, for health services futures contracts to have value, there must be volatility in the market.

B. Market Volatility

How many physicians does America need? There is little question that the answer to this question is controversial.¹⁷⁷ After an influential report predicted that by the year 2020 there would be a shortage of 200,000 physicians in the U.S.,¹⁷⁸ this report was attacked from numerous quarters. Physician workforce estimates are notoriously variable depending on: (1) the study design,¹⁷⁹ (2) how supply and demand are estimated,¹⁸⁰ (3) how well physicians are to be

2005, at 25, available at http://www.acpenet.org/MembersOnly/pejournal/2005/November_December/Weber.pdf (P4P may have unintended consequences).

¹⁷⁶ M.L. Baker, *Changing Physicians' Incentives Needs IT*, EWEK.COM, Feb. 8, 2006, <http://www.eweek.com/article2/0,1895,1922514,00.asp>; Mark Moran, *Pay for Performance Must be Quality Issue, AMA Says*, 40 PSYCHIATRIC NEWS 9 (2005) available at <http://pn.psychiatryonline.org/cgi/content/full/40/14/9-b>; AMERICAN COLLEGE OF PHYSICIAN EXECUTIVES, PAY-FOR-PERFORMANCE SURVEY RESULTS, <http://www.acpe.org/education/surveys/p4p/index.htm> (last visited Nov. 30, 2006).

¹⁷⁷ One-tenth of the U.S. workforce is employed in health care related activities and almost two-thirds of health care spending goes to cover labor costs. Bram Briggance, *Health Care Workforce Issues*, Presentation to National Conference of State Legislatures, Seminar for New State Legislators (Apr. 2, 2005), available at <http://www.hsrnet.net/ahrq/newleg/session9.htm>.

¹⁷⁸ Richard A. Cooper, *Weighing the Evidence for Expanding the Physician Supply*, 141 ANNALS INTERNAL MED. 705 (2004).

¹⁷⁹ For example, estimates of physician supply and demand depend on whether the calculation was based on workforce analysis or benchmarking techniques. See Daniel C. Goodman et al., *Benchmarking the U.S. Physician Workforce: An Alternative to Needs- Based or Demand- Based Planning*, 276 JAMA 1811 (1996).

¹⁸⁰ Myrtle Croasdale, *Physician Workforce Estimates Far Apart*, AMNEWS, June 20, 2005, available at <http://www.ama-assn.org/amednews/site/free/prsa0620.htm>; Larry A. Green & Robert L. Phillips, Op-Ed., *The Family Physician Workforce: Quality,*

reimbursed,¹⁸¹ (4) how certain wild card-factors (like disruptive innovation¹⁸² and policy decisions¹⁸³) are analyzed, (5) how the maldistribution of physicians is handled,¹⁸⁴ and (6) how retired and underemployed physicians are counted.¹⁸⁵ Yet, even without knowing the exact number of physicians needed, we can be sure that there will be continued volatility in the supply of physicians due to (1) regional variations in physicians, (2) disruptive innovations, (3) physician work preferences, and (4) patient preferences.¹⁸⁶

Not Quantity, AMERICAN FAMILY PHYSICIAN, June 15, 2005, at 2248; Alan M. Garber, & Harold C. Sox, *The U.S. Physician Workforce: Serious Questions Raised, Answers Needed*, 141 ANNALS INTERNAL MED. 732 (2004).

¹⁸¹ See *supra* note 177.

¹⁸² Disruptive Innovation is new technology that replaces older methods of performing a task or solving a problem. See Clayton M. Christensen et al., *Will Disruptive Innovations Cure Health Care?*, HARV. BUS. REV., Sept.-Oct. 2004, at 104-05.

¹⁸³ For example, how much medical care we allow physician extenders to provide or whether knowledge from stem cell research is applied to clinical medicine are policy issues.

¹⁸⁴ Physicians are maldistributed with respect to geography and type of physicians; physicians are disproportionately concentrated in urban areas and certain states. Wendy Abdo & Mike Broxterman, *Physician Employment Trends*, PHYSICIAN'S NEWS DIGEST, June 2004, available at <http://www.physiciansnews.com/business/604abdo.html>. In New York State there are 305 physicians per 100,000 population; but in California, a state where managed care is strong, there are only 190 physicians per 100,000 population. Edward S. Salsberg & Carl J. Getto, *Planning for the Physician Workforce*, Presentation to the American Medical Association Section on Medical Schools (Dec. 2001), available at <http://www.ama-assn.org/ama1/pub/upload/mm/44/speakersumi-01.doc>. The number of family practice and internist physicians is approximately 32 physicians per 100,000 population. See Green & Phillips, *supra* note 180. This data suggests that most of the variation in physician density occurs with specialists. *Id.*

¹⁸⁵ Although the U.S. has "800,000 active physicians," according to the Department of Labor there are only 600,000 full-time jobs for physicians. Dennis Cauchon, *Medical Miscalculation Creates Doctor Shortage*, USA TODAY, Mar. 2, 2005, at 1A, available at http://www.usatoday.com/news/health/2005-03-02-doctor-shortage_x.htm; Abdo & Broxterman, *supra* note 184.

¹⁸⁶ Circumstantial evidence documenting volatility in the supply of physicians can be found in the wide variability of the price for physician services.

1. Regional Variations in the Supply of Physicians

For more than 30 years, it has been recognized that the distribution of physicians in the U.S. is not uniform.¹⁸⁷ Traditionally, physicians have preferred to practice in urban areas, creating a surplus of physicians in large metropolitan areas. Today, this practice pattern appears to be changing due to cuts in reimbursement,¹⁸⁸ rising medical malpractice costs,¹⁸⁹ unprecedented competition from physician extenders,¹⁹⁰ as well as other reasons. As a result, there is a net emigration of physicians from metropolitan regions to more rural regions where competition is perceived to be less.¹⁹¹ In extreme cases, the competition among physicians in metropolitan areas has convinced some physicians to move overseas¹⁹² or to retire early.¹⁹³ On a macroeconomic scale, such physician movement creates regional flux in the supply and demand of physicians at a particular location.

Regional variation in physician supply is an even greater issue in Europe. Unlike the U.S., regional variation in the *per capita* supply of physicians in Europe has been traced to dwindling enrollment in the medical schools of affluent countries like Great Britain and

¹⁸⁷ John Gittelsohn & Alan Gittelsohn, *Small Area Variations in Health Care Delivery* 182 SCIENCE, 1102 (1973); Jack Werner et al., *Designation of Physician Shortage Areas: The Problem of Specialty Mix Variations*, 16 INQUIRY 31 (1979); Paul Wing & Christopher Reynolds, *The Availability of Physician Services: A Geographic Analysis*, 23 HEALTH SERVICES RESEARCH 649, 663 (1988).

¹⁸⁸ Memorandum from Kevin Burke to the Board of Directors of the Am. Acad. of Fam. Physicians, Federal and State Legislative Update (Feb. 17, 2006), available at <http://www.aafp.org/online/en/home/policy/federal/update/feb1706.html>.

¹⁸⁹ Daniel Kessler et al., *Impact of Malpractice Reforms on the Supply of Physician Services*, 293 JAMA 2618, 2623 (2005).

¹⁹⁰ Rob Roberts, *Surgeons Hope to Earn a Cut of Spa Market*, KAN. CITY BUS. J., Mar. 10, 2006, available at <http://bizjournals.com/kansascity/stories/2006/03/13/story5.html> (physician extenders perform minimally invasive procedures); Julius Karash, *Open Wide: Walk-in Clinics Staffed by Nurse Practitioners Can Now be Found in Area Osco Stores*, KAN. CITY STAR, Jan. 22, 2006, at H1 (physician extenders working as primary care physicians); Leah Sansbury, *Physicians' Use of Nonphysician Healthcare Providers for Colorectal Cancer Screening*, 25 AM. J. PREVENTIVE MED. 179, 184-85 (2003) (numbers and roles of physician extenders are rapidly expanding).

¹⁹¹ Bob Keavenly, *Physician Friendly States*, PHYSICIAN PRACTICE, July-Aug. 2003, <http://www.clarian.org/physicianrecruitment/includes/physicianFriendlyArticle.pdf>.

¹⁹² McLean, *Future of Telemedicine*, *supra* note 1; McLean & Richards, *supra* note 1.

¹⁹³ Mike Leavitt, *First Days as Secretary*, Speech to American Medical Association (Mar. 15, 2005), available at <http://www.hhs.gov/news/speech/2005/050315.html>.

Germany.¹⁹⁴ Some disciplines, such as pathology, psychiatry, anesthesia, and surgery, have been hit particularly hard because the teachers of these disciplines are retiring faster than new physicians can be trained.¹⁹⁵ These affluent countries of the European Union (E.U.) are learning to cope with the variable supply of providers by importing physicians. The downside of this solution is that it can be costly. In regions of Europe where the shortage of physicians is most acute, the local market has to pay a physician as much \$500.00 per hour to secure an adequate supply of physicians on nights, weekends, and holidays.¹⁹⁶

2. Disruptive Innovations

While physician movement impacts the supply of physicians, it is probably not the greatest source of supply volatility. Disruptive innovations, *i.e.*, any new technology that supplants more traditional technology because it is cheaper and/or more convenient,¹⁹⁷ is an economic force that is applicable to medicine.¹⁹⁸ How telemedicine, a particular form of disruptive innovation,¹⁹⁹ affects the supply and demand of physicians is not yet clear. However, other disruptive innovations have unquestionably affected the number of physicians' positions. For example, consider the use of stents to improve angioplasty.²⁰⁰ For years, because angioplasty provided inferior results, the mainstay of managing multivessel coronary artery disease was cardiac surgery. But in the 1990s, the use of drug-eluting stents improved angioplasty outcomes so much that today the outcomes of

¹⁹⁴ Jack Ewing et al., *Long-Haul House Calls*, BUS. WEEK, Jul. 18 2005, at 22.

¹⁹⁵ *Id.*

¹⁹⁶ *Id.* "In Poland, British recruitment agencies have advertised annual salaries of \$90,000, below average for a British doctor but a fortune in Poland, where experienced doctors earn only about \$15,000. Although there is considerable paperwork involved, E.U. regulations make it fairly easy for gynecologists, pediatricians, and other specialists to work outside their home countries." *Id.*

¹⁹⁷ McLean, *Future of Telemedicine*, *supra* note 1 (citing Clayton M. Christensen et al., *supra* note 182); Richard Bohmer & John Kenargy, *Will Disruptive Innovations Cure Health Care*, HARV. BUS. REV., Sept.-Oct. 2000, at 3.

¹⁹⁸ Bruce Lytle & Michael Mack, *The Future of Cardiac Surgery: The Times, They Are a Changin'*, 79 ANNALS THORACIC SURGERY 1470, 1470-72 (2005).

¹⁹⁹ Jeff Goldsmith, *Technology and the Boundaries of the Hospital: Three Emerging Technologies*, 23 HEALTH AFFAIRS 149, 149-57 (2004); Nicholas P. Terry, *Cyber-Malpractice: Legal Exposure for Cybermedicine*, 25 AM. J.L. & MED. 327, 334-53 (1999).

²⁰⁰ A more detailed discussion of this subject can be found elsewhere. See McLean, *China as a Case Study*, *supra* note 1.

angioplasty for multivessel coronary artery disease are as good as surgery.²⁰¹ Not surprisingly, the need for cardiac surgeons is falling rapidly.

More generally, disruptive innovations that are prevalent in medicine today²⁰² destroy the demand for certain types of physician. Once freed from a particular practice of medicine, physicians can move into other fields, like telemedicine. But the telemedicine physician is not bound by geography and is free to participate in other markets. Consider the situation in Europe. Presumably one of the reasons that English speaking physicians are paid so much to provide medical coverage during off hours is to cover the physician's travel expenses. Because telemedicine physicians do not physically travel, the cost of physician-travel could be avoided by the greater use of telemedicine. So, perhaps someday soon, some of the underemployed cardiac surgeons in this country will be making telemedical house calls to patients in Great Britain. Of course, when that day comes, the disruptive innovation of telemedicine will impact the supply of physicians in remote locations.

3. Physician Work Preferences

Volatility in the physician labor force is also introduced by the changing work preferences of physicians. For example, the introduction of the 80-hour work week for residents has negatively impacted the work ethic of surgery residents.²⁰³ In radiology, many residents no longer believe that they should have to be on-call at all.²⁰⁴ Of course, the attitude of residents towards their work merely reflects that of the medical community. Depending on the geographic location of a

²⁰¹ Alfredo Rodriguez et al., *Five Year Follow-Up of the Argentine Randomized Trial of Coronary Angioplasty With Stenting Versus Coronary Bypass Surgery in Patients With Multiple Vessel Disease*, 46 J. AM. C. CARDIOLOGY 582, 582-88 (2005); Patrick Serruys et al., *Five-Year Outcomes After Coronary Stenting Versus Bypass Surgery for the Treatment of Multivessel Disease: The Final Analysis of the Arterial Revascularization Therapies Study (ARTS) Randomized Trial*, 46 J. AM. C. CARDIOLOGY 575 (2005); J. Aoki et al., *Insights from ARTS*, 26 EUR. HEART J. 1488, 1488-93 (2005).

²⁰² For example, surgeons who are not trained in laparoscopic technique will soon be unemployed. David V. Cossman, *The Death of Open Surgery*, GEN. SURGERY NEWS, Mar. 2006, at 1.

²⁰³ McLean, *80-Hour Work Week*, *supra* note 6.

²⁰⁴ Renee DiIulio, *Step By Step - Technology to the Rescue for the Understaffed*, MEDICAL IMAGING, Aug. 2005, available at http://www.medicalimagingmag.com/issues/articles/2005-08_07.asp.

physician, it can be hard to find a specialist during off-hours.²⁰⁵ This scarcity of physicians during off-hours has served as the foundation for outsourcing radiology services to foreign countries on nights, weekends, and holidays.²⁰⁶ Moreover, the changing work ethic of physicians not only affects the diurnal variation in the supply of physicians, but it also negatively impacts society. For physicians, how hard they work is a personal decision. For society, the physicians' work ethic impacts access to medical care (and quality of care) on an almost hourly basis.

4. Patient Preferences

Finally, volatility in the supply and demand of physicians is being impacted by patient preferences. When patients in the U.S. have to pay money out of pocket²⁰⁷ or when patients in other countries are confronted with a long queue to obtain medical services,²⁰⁸ they look for non-traditional solutions to their health care needs. In particular, medical tourism, which combines a vacation with medical treatment, is growing at a staggering pace.²⁰⁹ In 2005, 600,000 people traveled to Thailand for various elective surgical procedures, adding \$500 million to the Thai economy.²¹⁰ Driving medical tourism is the economics of health care. For example, a heart operation that would cost \$150,000 in Baltimore costs only \$15,000 in Singapore.²¹¹ This economic differential allows travel agents, hotels, and medical providers to combine their efforts to attract foreign patients to receive medical care and a vacation for less than the patient would pay an American health

²⁰⁵ David Magid et al., *Relationship between Time of Day, Day of Week, Timeliness of Reperfusion, and In-Hospital Mortality for Patients with Acute ST-Segment Elevation Myocardial Infarction*, 294 JAMA 803, 803-12 (2005); Mary Ann. Roser, *Neurosurgeons in Short Supply*, AMERICAN-STATESMAN, May 19, 2002; S. Ahamed, *Malpractice Insurance Coverage and Telehealth*, presented at the 28th Annual Meeting of the Physicians Insurers Association of America (May 25-28, 2005).

²⁰⁶ McLean, *Future of Telemedicine*, *supra* note 1; McLean & Richards, *supra* note 1.

²⁰⁷ Many insurance policies today do not cover the cost of transplantation of organs and or other expensive medical treatments which must then be paid out of pocket. *See Simkins v. NevadaCare*, 229 F.3d 729 (9th Cir. 2000).

²⁰⁸ Deborah Borfritz, *Medical Tourism: A Threat to the U.S. Hospitals?*, Strategic Health Care Marketing, Aug. 2005.

²⁰⁹ *Vacation, Adventure and Surgery?*, 60 MINUTES, Sept. 4, 2005, <http://www.cbsnews.com/stories/2005/04/21/60minutes/main689998.shtml>.

²¹⁰ Linda K. Nathan, *Operation Vacation*, CONDÉ NAST TRAVELER, Jan. 2006.

²¹¹ Borfritz, *supra* note 208. In countries like the U.K., where medical costs are much less, medical tourism is attractive as means avoiding a queue. *Id.*

care provider. In South Africa, Surgeons and Safari will provide a woman with a breast augmentation followed by a seven night stay in a five-star Johannesburg hotel and a two-day bush safari trip for less than \$9,000.²¹²

Interestingly, changes in health insurance may stimulate the growth of the medical tourism industry. Major U.S. health insurers are now covering medical services delivered by foreign providers. Blue Cross has already created a network of credentialed providers in more than 200 countries.²¹³ For insurers, providing such coverage is viewed as empowering patient choice. Such insurance policies could save insurers money if a patient selected a less expensive foreign provider (even if the insurer has to cover a vacation).²¹⁴ Moreover, medical tourism may be stimulated by a shift towards high deductible health insurance plans where the patient covers the deductible with money from a health savings account.²¹⁵ Once international regulatory bodies start monitoring and publishing provider-specific outcomes and a suitable method for handling international medical malpractice litigation is developed, commentators believe that medical tourism could become a trillion-dollar global market in a decade or two.²¹⁶

Implicit in the concept of medical tourism is the notion that many patients (and the federal government) want affordable healthcare. Medical tourism demonstrates that if a physician provides affordable, timely, and quality medical care, patients do not care about a physician's nationality. But, seeking out foreign physicians is not going to be for everyone. Not only will some patients not have appropriate insurance coverage to participate in medical tourism, but some patients will also not be interested in traveling long distances to get affordable health care. Fortunately for these patients, the 21st century allows them to receive the cost-avoiding benefits of medical tourism without the hassle of travel.

²¹² Nathan, *supra* note 210.

²¹³ Borfitz, *supra* note 208.

²¹⁴ *Id.*

²¹⁵ Devon Herrick, The Heartland Institute, *The Key to Reforming U.S. Health Care: Put Patients in Charge*, <http://www.health--savings--accounts.com/article-22.htm> (last visited Nov. 28, 2006).

²¹⁶ Borfitz, *supra* note 208. Cf. Stuart Altman et al., *Could U.S. Hospitals Go The Way Of U.S. Airlines?*, 25 HEALTH AFFAIRS 11, 12 (2005). Foreigners seeking medical care today are much fewer today than in the past and the U.S. health system is beginning to implode from few customers and the weight of cross subsidization, just like the car and airlines industries. *Id.*

C. Telemedicine: Free-Flow of Medical Services

From mundane video teleconferencing between physicians to cybersurgery (*i.e.*, remote robotic surgery), technology is no longer a barrier to providing medical care telemedically.²¹⁷ Similarly, capital requirements only pose a barrier to market entry at the high-tech end of the telemedicine spectrum of services.²¹⁸ Rather, the most significant barriers to global trade in telemedical services are trade barriers and the uncertainty associated with cybermalpractice liability.²¹⁹ Assuming that the members of the World Trade Organization (WTO) will want to continue to expand their economies through globalization,²²⁰ the rules of the WTO are likely to liberalize trade in global health services by removing trade barriers.²²¹ Accordingly, the most challenging aspect of entering the global telemedicine market will concern how to manage medical malpractice exposure.²²² This is a solvable problem and, if sufficient demand for global telemedical services appears, it is likely that the world's leaders will find a solution to cyberspace jurisdiction in order to expand their health care sectors. Once a significant volume of telemedical services starts to flow freely around the globe according to standardized contracts,²²³ unless market volatility is lessened by yet undisclosed means, the stage will be set to commoditize medical services.

Will there be sufficient demand for telemedical services in 2020 to support commoditization of telemedical service? The short answer is probably "yes," although the evidence to support this conclusion is circumstantial. By analogy, consider what has happened to the automotive market. When the Japanese began exporting cars to America in the 1960s, the market for "cheap" Japanese cars was small.²²⁴ During the 1970s, in part due to an oil shortage, America's

²¹⁷ McLean, *Offshoring of American Medicine*, *supra* note 1.

²¹⁸ McLean, *China as a Case Study*, *supra* note 1.

²¹⁹ McLean, *Future of Telemedicine*, *supra* note 1.

²²⁰ Heather Timmons, *Nations Rebuild Barriers to Deals*, N.Y. TIMES, Feb. 28, 2006, at C1 (Protectionism sentiments are on the rise particularly in Europe and to less extent in the U.S. and elsewhere).

²²¹ McLean, *Future of Telemedicine*, *supra* note 1; McLean & Richards, *supra* note 1.

²²² McLean, *Future of Telemedicine*, *supra* note 1; McLean & Richards, *supra* note 1.

²²³ Standardized telemedicine contracts will be explained in more detail in Part IV. However, it stands to reasons if standardized physician services contracts are coming to the physical world, standardized contracts will be a fixture of telemedicine soon because payors of medical services are not going to reinvent the wheel in cyberspace.

²²⁴ DAVID HALBERSTAM, *THE RECKONING* (1982).

attitude towards Japanese manufactured cars softened.²²⁵ But, in part, the popularity of the Japanese cars rose, and continues to rise, in America because of the quality of Japanese cars.²²⁶ The lesson that Toyota, Honda, and Nissan should teach the U.S. health care market is that the demand for foreign medical services will continue to rise, if these services are provided with quality. Medical tourism has already demonstrated that this principle applies to health care services.

Demonstration of quality in foreign health care services will be substantially different from demonstration of quality in foreign cars. The recognition of the quality in Japanese cars took years because it was spread by word of mouth.²²⁷ To a degree, quality of foreign providers in the medical tourism industry is being spread by word of mouth too.²²⁸ Yet, as America adopts the concept of medical quality based on systems of TQM (*e.g.*, medical quality is less than three percent errors), foreign providers that wish to compete in the American health care market, the largest market in the world,²²⁹ will increasingly adopt our definition for medical quality. JCAHO, in fact, is already facilitating the standardization of quality by accrediting hospitals in third-world countries (including India and China)²³⁰ and promoting the concept of accreditation by proxy.²³¹ Once JCAHO's cachet is placed on a foreign hospital (and indirectly its physician staff), the hospital will be able to assure American medical tourists, and those Americans who purchase foreign telemedical services, that they are receiving a quality of care comparable to what can be purchased in America.

²²⁵ *Id.*

²²⁶ MAYNARD, *supra* note 143.

²²⁷ HALBERSTAM, *supra* note 224; MAYNARD, *supra* note 143.

²²⁸ Borfitt, *supra* note 208; Nathan, *supra* note 212. In the nascent world of telemedicine, most articles dealing with threat of foreign competition raise xenophobic specters of potential horror from care given by unqualified physicians; for example, *see* Brice, *supra* note 4.

²²⁹ MICHAEL LEWIS, *THE NEW NEW THING A SILICON VALLEY STORY* (2000).

²³⁰ Joint Commission on International Accreditation, <http://www.jointcommissioninternational.org> (last visited Dec. 12, 2006).

²³¹ Joint Commission on Accreditation of Healthcare Organizations, Manual MS.4.120. Briefly, accreditation by proxy allows a hospital in America to accept, under certain conditions, the accreditation folder of physician prepared by a JCAHO accredited foreign hospital at face value. *Id.* This rule would therefore facilitate foreign telemedicine providers obtaining hospital staff privileges in America.

Moreover, JCAHO accreditation will facilitate the global reporting of providers.²³² This systematic dissemination of provider-specific quality information will differ substantially from the quality information in the automotive industry. Provider-specific quality information will be made readily available on the Internet. Accordingly, in a telemedical world, it is likely that dissemination of provider quality will occur at a much faster rate than by word of mouth. Once Americans realize that there are many foreign providers that provide a medical grade of quality at one-tenth the price of American physicians,²³³ why won't the U.S. health care sector move offshore just as the automotive sector has?

Recently, the *New England Journal of Medicine* took notice of the growing threat from foreign telemedicine providers. In an editorial on the use of telemedicine to provide radiology coverage during off-hours, the journal acknowledged that a substantial market for cheap telemedical services was already in existence.²³⁴ The editorial went on to observe that in the future it will be hard for American physicians to protect the domestic market from foreign invasion. After all, if a foreign doctor is qualified to provide services at 2 AM, it is hard to argue that that same physician is not qualified to provide the same services at 2 PM.²³⁵ How can we prevent the offshoring of American medicine? Recall that a mature commodities market stimulated the growth of the agricultural sector. In a similar way, a mature telemedicine commodities market could stimulate growth of the U.S. health care sector.²³⁶ So, one method that could be used to preserve the domestic health care market would be to convert it to a commodities market.

²³² JCAHO accreditation has been endorsed by World Health Organization and the World Bank as means of continuous quality improvement. Borfitz, *supra* note 208.

²³³ Brice, *supra* note 4.

²³⁴ Robert M. Watchter, *The "Dis-location" of U.S. Medicine- The Implications of Medical Outsourcing*, 354 NEW ENGL. J. MED. 661, 661-65 (2006).

²³⁵ *Id.*

²³⁶ While most commodities markets focus on goods, medicine would not be the first service that was developed into a commodities market. See *Commodities / Markets, Business Week* Online, http://host.businessweek.com/businessweek/Market_Statistics.html?Exchange=FUTURE&Symbol=YG&template=mscbot.htm; Chicago Board of Trade, *Our History*, <http://www.cbtc.com/cbot/pub/page/0,3181,942,00.html>. (last visited Nov. 30, 2006); Jerry Skees et al., *New Approaches to Private Public Crop Yield Insurance*, WORLD BANK, available at <http://www.itf-commrisk.org/documents/pubprivyieldins.pdf> (last visited Dec. 1, 2006). Nor would telemedicine be the first commodity traded internationally. See PARTNOY, INFECTIOUS GREED, *supra* note 56.

III. THE TELEMEDICAL EXCHANGE BANK

A. Operations

1. Futures Contracts & the Exchange

A commodities market in telemedical services would operate in an analogous fashion to other commodities markets. Physicians, from anywhere in the world, would enter into standardized telemedical service contracts (STSCs) with an exchange. These STSCs would require physicians to demonstrate that they were (1) appropriately licensed and insured,²³⁷ (2) appropriately JCAHO credentialed by proxy,²³⁸ and (3) had posted a performance bond.²³⁹ When a physician entered into a STSCs, the physician would agree to telemedically deliver a round lot²⁴⁰ of medical services at a medical grade of quality (e.g., less than three percent of the services would deviate from prescribed guidelines) to a particular location at a given time or period of time.²⁴¹ The location for the delivery of medical services would be limited to a predetermined number of high-volume centers of excellence (COE).²⁴² The price for physician services would be determined by the market price on the day of the sale, and physicians would be guaranteed this remuneration regardless of whether their services were used on date of delivery. Accordingly, under such futures contracts physicians would transfer the risk of being idle on a particular day to the exchange. Importantly, society would benefit from STSC

²³⁷ A discussion of the issue associated with licensing and insuring global telemedical providers is beyond the scope of this article; *see generally* McLean, *Future of Telemedicine*, *supra* note 1 for a discussion of this issue.

²³⁸ *See* Joint Commission on Accreditation of Healthcare Organizations MS 4.10. Accreditation by proxy would greatly facilitate the development of a global telemedicine market because credentialing would not have to be done by the remote hospital.

²³⁹ The purpose of this bond would be cover the exchanges losses that might arise from the physician failing to deliver the agreed upon number of services or services that were not at a medical grade of quality.

²⁴⁰ A round lot is a "normal unit of trading of a security; 100 shares of stock or 5 bonds." Investor World.com, Round lot, http://www.investorwords.com/4327/round_lot.html (last visited Dec. 1, 2006).

²⁴¹ In the event that a physician delivered a non-conforming lot (i.e. with more than 3% medical errors) the physician would be required to post a performance bond designed to reimburse the exchange from any losses it may incur.

²⁴² Commodities markets need to have limited trading times, exchanges and delivery locations. *See* discussion *supra* Part II.

because physicians would have no incentive to over- or under-prescribe medical services.

In its capacity as a clearinghouse, the exchange would enter into reciprocal STSCs with the COE, including hospitals, ambulatory care centers, and/or large clinics. More specifically, the COE would agree to purchase from the exchange some multiple of a round lot of telemedical services to be delivered at a certain time or during a certain time period. The exchange would warrant that all services purchased would conform to medical grade of quality (*e.g.*, medical errors in the lot would be less than three percent). In the event that the actual services delivered to the COE did not conform to these requirements, the exchange would reimburse the COE for its losses.²⁴³

Finally, the COE would agree to compensate the exchange provider with the agreed upon price regardless of whether the COE actually used the purchased medical services. The COE would agree to take this risk because surplus medical services could be sold on a spot market.²⁴⁴ Conversely, if the hospital did not purchase sufficient telemedical services for its actual demand on a given day, the hospital could purchase these services from a spot market.²⁴⁵ This spot market would act to match physician supply with patient demand, such as those that arise due to regional and diurnal variations, more precisely than could otherwise be achieved in a traditional medical setting.

At this point, a hypothetical would be useful.²⁴⁶ Consider the world of 2026, where every medical service can be delivered in person or telemedically. In person medical services are delivered just as they were in 2006. Contracting for telemedical services, however, is done through futures contracts with The Regulated Medical Bank (TRMB), a commodities exchange and clearinghouse for telemedical services. Assume further that based on the outcomes of patient safety studies conducted between 2010 and 2015, a consensus was reached that internal medicine physicians, like Dr. Patrick who lives in Paris, should be able to provide 40 patient encounters with medical grade quality in a 24-hour period, and surgeons, like Dr. Alex who lives in Sydney, can perform two major operations with medical grade quality in a 24-hour period. Accordingly, the TRMB defined the round lot for internal

²⁴³ The exchange would loose nothing because it had previously had the physician post a performance bond to cover this exigency.

²⁴⁴ See discussion *infra*.

²⁴⁵ *Id.*

²⁴⁶ In this hypothetical there is no intent to comprehensively illustrate a commodities market in telemedicine. The goal is to illustrate how trading in STSCs might occur.

medicine services to be 40 patient encounters/24 hours and the round lot for surgical services as two major cases/24 hours.

On April 3, 2025, Drs. Patrick and Alexander sell their services for delivery in the first week of July to the TMRB. According to the rules of the exchange, all futures contracts for physician services must be a STSC that defines such items as medical grade quality, round lots, and remedies for breach of contract. In April, when the doctors sell their services for the first week of July, the market anticipates that many people will be on vacation in America. Accordingly, the fair market value (FMV) for a round lot of Dr. Patrick's services is \$1,000.00, but fear of a surplus of alcohol related injuries during the American holiday drives the FMV for a round lot of Dr. Alexander's services to \$2,500.00. In early April, both physicians are happy to be locked into these prices, which provide them with a reasonable profit.

On April 10, 2025; the next available day for trading STSCs on the TRMB exchange,²⁴⁷ the exchange sells Dr. Patrick's future contract to Moscow General Hospital, the highest bidder for \$950.00. Although TRMB lost money on trading Dr. Patrick's services, this loss is easily made up by trading elsewhere. Dr. Patrick, on the other hand, is indifferent to this loss having previously locked in the price of his services. Moscow General is happy because commodities contracting for physician services means that (1) the hospital can secure quality physician services despite a scarcity of physicians in Russia, (2) the hospital does not have to pay exaggerated wages to migrant physicians from Poland to secure coverage on nights and weekends, and (3) the hospital does not need to carry a staff of salaried physicians who sometimes sit idle for long periods when patient demands are low. In short, Moscow General has come to understand that there are distinct advantages to participating in a global commodities market for medical services.

Meanwhile back at the TRMB surgical services for the first week of July 2025 are trading at a premium after information was leaked from the beer vendors' association that beer sales were running at ten percent above last year. This information stimulates Man's Best Friend Hospital (MBFH) in Atlanta and Jefferson Memorial Hospital in Washington, D.C. to bid up the price of surgical service for a first week in July delivery date to \$3000 per round lot.

²⁴⁷ In a global world, there may be more than one exchange for telemedical services, just as there are a number of commodities exchanges today. Moreover, telemedical exchanges may not trade services every day, just as some commodities are not traded every day.

On July 4th, it rains in Atlanta and there is very little violence that requires a surgeon's attention. Accordingly, it looks like many of the STSC for surgical services will expire unused. But the weather in Washington is warm, large quantities of beer are consumed, and a riot ensues generating hundreds of people who require a surgeon's attention. Jefferson Memorial finds that it has insufficient surgical expertise on hand to cover the volume of trauma generated by the riot. Using the spot market for telemedical services, Jefferson purchases additional STSC from MBFH for \$4000 per round lot. To deliver these services, all MBFH has to do is redirect Dr. Alexander's signal to Jefferson Memorial.²⁴⁸ Although Jefferson Memorial had to pay a premium to MBFH to provide surgical coverage for its patients, the hospital is not unhappy because (1) it is going to profit from volume sales of surgical services, and (2) it does not need to worry about being sued for negligently staffing its facility.²⁴⁹ In short, the spot market sale of surgical services between the two hospitals was a win-win situation for both parties. Dr. Alexander, however, is less than happy because by locking in the price of his services, he missed out on benefiting from the rising market.

2. Hedging and Speculation

Recall that hedging occurs when market participants use an option contract to take a position contrary to their futures market's position to maximize profit. Had Dr. Alexander been more savvy in the hypothetical, he could have capitalized on the rising market by purchasing a call telemedical option contract. For example, when Dr. Alexander first sold his services to the exchange, he could have purchased an option contract for delivery of a round lot of surgical services for July delivery. If the market did not rise, the doctor could have allowed the option to expire unexercised – thereby losing only the price of the option contract. Alternatively, if – as in the hypothetical – the market for surgical services rose between April and July, the doctor could have exercised his option, purchased the surgical services at the agreed upon price, and then sold those services on the spot market for immediate delivery and made a profit. In fact, a spot market for telemedical services would be an inevitable consequence of a

²⁴⁸ See *supra* note 128.

²⁴⁹ A discussion of cybermedical malpractice is beyond the scope of this article. *But see generally* McLean & Richards, *supra* note 1; McLean, *Future of Telemedicine*, *supra* note 1.

telemedical commodities market that locked-in the physician's price at the time of contracting. Failure to develop a spot market for telemedicine would mean that some parties would take unnecessary losses and there would be no way to redistribute the supply of physicians to match the demand of patients.

In the hypothetical, all the transactions occurred between those in the market. But nothing prevents non-market participants from engaging in speculation. For example, consider an attorney who wished to participate in the health care market. In the past, the attorney would have had to go to medical school, start a business that sold medical products, or started a medical consultation business. But in a world with a telemedical commodities market, that attorney could participate in the speculative market for health care services. For example, imagine that a health care attorney bought ten round lots of radiology services on April 3rd. Although the attorney would never use these services, he or she could re-sell these services at a future date to a hospital in Farawayastan. Why would society allow an attorney – or for that matter any non-physician – to participate in a telemedical commodities market? Just as with agricultural goods, increasing numbers of speculators in the market would help to diffuse the risk of loss out of the market and increase liquidity to the market.²⁵⁰

B. Advantages

Perhaps the greatest benefit that would flow from commoditizing telemedicine is the potential for price stabilization and market growth. As we move into a telemedical future, for a time it is likely that the unit price for health care services will fall due to increased provider competition.²⁵¹ Ultimately, the price will stabilize, but regional and diurnal variations in access to care will remain, unless every country requires its physicians to work in shifts.²⁵² A global commodities

²⁵⁰ See discussion *supra*, Part III.

²⁵¹ DEP'T OF JUSTICE & FED. TRADE COMM'N, IMPROVING HEALTH CARE: A DOSE OF COMPETITION (July 2004), available at <http://www.ftc.gov/reports/healthcare/040723healthcarerpt.pdf>.

²⁵² McLean, *80-Hour Work Week*, *supra* note 6. Shift work in medicine has its detractors; for example it increases the number of handoffs thereby increasing the potential for medical errors and adverse events. See Katherine C. Kellogg et al., *Resistance to Change in the Surgical Residency: An Ethnographic Study of Work Hours Reform*, 202 J. AM. C. SURGEONS 630 (2006); AA Gawande et al., *Analysis of Error Reported by Surgeons at Three Teaching Hospitals*, 133 SURGERY 614, 614-21 (2003).

market in telemedical services would help to alleviate the relative reduction in the physician work force that occurs during off-hours.

Moreover, free market theory argues that the best prices for goods or services are obtained by trading free of regulatory inhibition.²⁵³ In the past, the government's practice of administratively setting the price for reimbursement of medical services for Medicare and Medicaid resulted in unintended consequences.²⁵⁴ The government's belated recognition of the limitations and unintended consequences of administrative pricing is a significant factor in the government's desire to move towards P4P reimbursement. Assuming the U.S. continues to move towards solidifying the concept of what constitutes medical quality, commoditizing medical services would appear to be a logical step beyond P4P.

A commodities market for health care services could also benefit providers. Subject to patient safety limitations,²⁵⁵ physicians would be able to set their own hours and maximize their income through hedging. In today's health care market, the two leading factors that trigger physician job dissatisfaction are loss of professional autonomy and falling reimbursement.²⁵⁶ In a commodities market, which of necessity is standardized, physician autonomy is unlikely to return to the idiosyncratic days of the past. But commoditization of medicine would give physicians a greater level of professional autonomy than being an employee. By hedging, physicians would be able to maximize their income. Hospitals would similarly benefit. Because an important purpose of a commodities market is to shift production risk out of the market and onto speculators, hospitals may not need to engage in cost-shifting to hide losses.²⁵⁷ Moreover, in a global telemedicine commodities market, hospitals would no longer

²⁵³ Gary North, *Exchange Rate and Gold*, LEWROCKWELL.COM, <http://www.lewrockwell.com/north/north229.html> (last visited Dec. 1, 2006).

²⁵⁴ McLean, *supra* note 175.

²⁵⁵ It is likely physicians of the future will have work-time restrictions imposed upon them because of safety concerns much like how pilots and other common carriers today can only work a maximum number of hours per week. McLean, *80-Hour Work Week*, *supra* note 6.

²⁵⁶ William J. Hueston, *Rekindling the Fire of Family Medicine*, FAM. PRAC. MGMT., Jan. 2006 available at <http://www.aafp.org/fpm/20060100/15reki.html>.

²⁵⁷ A detailed discussion of hospital cost-shifting and its ramifications are beyond the scope of this article; *But see generally* Thomas R. McLean, *Smith v. Adams: Implications for Hospital Competition*, 3 AM. HEART HOSP. J. 120 (2006).

have to pay a premium to obtain specialist coverage during the off-hours.²⁵⁸

C. Concerns

Commoditization of medicine will not be a cure-all for society or health care providers. First, while many markets have been commodities in the last 30 years, Enron's experience with electricity and water demonstrates that efforts to commoditize markets may fail.²⁵⁹ Enron also teaches that when an entity gains control of a commodities market, the market may collapse if that business entity collapses or if it uses its proprietary knowledge to corrupt the commodities market.²⁶⁰

Another concern would be the regulation of a commodities market in telemedicine. Under the amended CEA, the CFTC has regulatory authority over all commodities.²⁶¹ Many individuals may find it aesthetically unpleasing if the CFTC regulated medicine because (1) most people in America would consider health care to have nothing in common with the agriculture or gold markets, and (2) with a few notable exceptions, the CFTC has rarely mustered the political will to enforce its regulations.²⁶² But, even if the CFTC was ideally suited to regulate a domestic commodities market,²⁶³ it is not clear that the rest of the world would consent to the CFTC's regulation of a global commodities market in telemedicine. In short, a good idea like the commoditization of medicine does not always allow for good law.²⁶⁴

A third concern is that when it comes to commodities, most successful markets have been predicated on a goods market. With some exceptions, such as crop insurance and the sale of various stock market indices, few services markets have been commoditized.²⁶⁵ As medicine is a service, a fair criticism of any suggestion to commoditize medicine is that such a suggestion is more fiction than fact. To this end, the

²⁵⁸ McLean & Richards, *supra* note 1; McLean, *Future of Telemedicine*, *supra* note 1.

²⁵⁹ MCLEAN & ELKINS, *supra* note 63.

²⁶⁰ *Id.*

²⁶¹ 7 U.S.C. 6(a)(1) (2006).

²⁶² Keaveny, *supra* note 89, at 1430. For example, Enron benefited from a lack of CFTC oversight. MCLEAN & ELKINS, *supra* note 63.

²⁶³ There may be nothing wrong with the CFTC's regulation or the existing laws governing commodities; it might be that commodities markets are negatively impacted by financial incentives created during times of market bubbles. Cudahy & Henderson, *supra* note 117.

²⁶⁴ Bell, *supra* note 106, at 159.

²⁶⁵ *Supra* Part II Section 3.

hypothetical in this paper may be exaggerating the benefits of a global commodities market in telemedicine because it suggests a global market for health care services would solve local mismatches of physician supply and patient demand. To a degree this is true. However, there is a limit to the type of local economic problems that can be resolved with globalization of any market. Local markets are important because they promote efficient allocation of resources and reduce informational asymmetries.²⁶⁶

Cyber medical malpractice is the final concern.²⁶⁷ Telemedical technology will not eliminate medical malpractice, and could make it worse.²⁶⁸ When a patient is injured by a provider that is literally half-way around the world, who is going to pay, which forum will adjudicate the litigation, and under which laws should liability be determined?²⁶⁹ These are all complex, but solvable, questions. For example, requiring physicians to post performance bonds to cover negligent acts could resolve many of the malpractice concerns. Unfortunately, posting performance bonds will drive up the cost of transactions in telemedicine. Moreover, how should a global market discipline a physician who repeatedly fails to deliver non-conforming telemedicine services?

IV. CONCLUSIONS

As we move into the 21st century, it seems fairly certain that telemedicine is here to stay. While the actual place of this disruptive innovation remains to be determined, when telemedicine is combined with standardized contracting for physician services it is possible for the first time to create a commodities market for medical services. This is because the free flow of medical services in a cyber media allows for futures contracting of physician services. Unprecedented advantages could arise from the commoditization of telemedicine, including price stabilizations and health care market expansion. But these benefits are

²⁶⁶ KENROY DOWERS & PIETRO MASCI, FOCUS ON CAPITAL: NEW APPROACHES TO THE DEVELOPMENT OF LATIN AMERICAN CAPITAL MARKETS (2003).

²⁶⁷ McLean & Richards, *supra* note 1; McLean, *Future of Telemedicine*, *supra* note 1.

²⁶⁸ Edward Richards & Katharine Rathbun, *Law and the Physician: A Practical Guide. Real Users v. Ideal Users*, <http://biotech.law.lsu.edu/xfiles/x948.htm> (last visited Sept. 26, 2006).

²⁶⁹ A discussion of cyber medical malpractice is beyond the scope of this article; *But see* McLean & Richards, *supra* note 1; McLean, *Future of Telemedicine*, *supra* note 1.

uncertain and growth of the telemedicine market will be tempered by medical malpractice concerns.

Discussion of a global commodities market in telemedical services may seem premature in 2006, but if the Age of Information has taught us anything, it is that the future comes much quicker today than it did only yesterday. So, now is the time to start considering the possibility of a futures market in telemedicine and the implications of such a market for health care and health law in the U.S.

