

**REPORT ON THE**

**“DISCUSSION PAPER PREPARED BY THE MARKET  
SURVEILLANCE PANEL OF THE ONTARIO ENERGY  
BOARD: MARKET POWER FRAMEWORK FOR THE IESO-  
ADMINISTERED ELECTRICITY MARKET  
NOVEMBER 2006”**

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# Executive Summary

1. The Market Surveillance Panel (MSP) has released a Discussion Paper which proposes a framework for identification of the exercise of market power in the Ontario electricity market.<sup>1</sup> The paper sets out a series of tests which would be used to determine whether market power has been exercised. The analysis incorporates various features specific to the Ontario setting. The purpose of the present report is to provide a review of the MSP proposals. We believe it is more fruitful to situate our discussion within a broader economic, regulatory and public policy perspective. To that end, in formulating our views, we incorporate experience from other jurisdictions. We also include some commentary on the specific tests being proposed.
2. Markets for electricity tend to be vulnerable to the exercise of market power. Unlike other markets, even small producers can have substantial impacts on prices. Thus it is not surprising that the MSP should be interested in protecting against the abuse of market power. In conducting its work over the past several years, the MSP has been guided by concepts similar to those being proposed in its Discussion Paper. Indeed, the proposed framework constitutes a codification and formalization of practices that have been in use by the MSP for a period of time.<sup>2</sup> However, the formal analytic framework and data requirements may be unnecessarily burdensome and elaborate, particularly given that according to the MSP, the existing process “has worked reasonably well to date”.<sup>3</sup> Moreover, since it began exercising this important function, the MSP has found no instances of abuse, nor has it launched any formal investigations.

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<sup>1</sup> “Market Power Framework For the IESO-Administered Electricity Market. Proposed Framework for Identification of the Exercise of Market Power. Discussion Paper prepared by the Market Surveillance Panel” November 2006.

<sup>2</sup> Discussion Paper, pages 1 and 12.

<sup>3</sup> Discussion Paper, page 12.

3. Given the explicit absence of any linkages to possible remedies, the increased regulatory burden for the MSP and for generators may not be justified. In any event, it would be useful to conduct an analysis to assess the potential benefits and costs of the proposed formal framework, given particularly that contracts, regulations and agreements presently ensure that most electricity sold in Ontario is not susceptible to manipulation in the spot market.
4. Spot market electricity prices can fluctuate widely from hour to hour. This is essentially because, unlike most other commodities, electricity cannot be stored. Unusual weather conditions, the unavailability of capacity, unexpected outages and conditions in neighboring linked markets can lead to price spikes unobserved in markets for other commodities. Under such conditions, identification of the exercise of market power on an hour-by-hour basis can become a formidable task. Unexpectedly high prices may be transitory or they may send useful market signals indicating scarcity of supply.
5. In assessing the monitoring and analytic framework that is being proposed, it is important to ask whether it contributes to productivity improvement and efficient use of resources in the short run, and to efficient investment in the longer term. There are arguments to suggest that excessive restrictions and scrutiny (for example, of spot prices) discourage rather than promote investment in the industry. Indeed, scarcity pricing is an important incentive for future investment.
6. Under intensely competitive conditions, one might expect suppliers to submit bids that reflect their short term marginal costs. However, to the extent that such bidding prevents firms from recovering their long term costs of supplying electricity, it is not reflective of a healthy, forward looking industry which is replenishing its capital stock

to meet future market demands. On the contrary, the exercise of market power – as measured by some of the short term statistics being proposed – may merely be an indication of efforts by generators to recover their long term costs. Thus, a monitoring strategy which puts greater emphasis on bid patterns and average market prices over longer periods of time to determine whether these are consistent with long term costs would create better incentives for investment in the industry. A longer term perspective may also provide a better basis for assessing the existence of abuse or inappropriate exercise of market power leading to market inefficiency.

7. For several decades, in markets where actual or potential competition is an insufficient form of economic discipline, regulators in many countries and industries have steadily moved away from cost of service or rate of return regulation and adopted more effective approaches based on incentive and performance based regulation. These approaches are associated with a more light-handed approach to regulation. In Ontario, the regulator has also recognized the value of incentive regulation and moved towards implementation in several areas. If it is the objective of the Ontario Energy Board to continue to refine and expand the role of incentive regulation, then one might also expect a more light handed approach to monitoring rather than the detailed, data-intensive approach being advanced by the MSP in the Discussion Paper.
  
8. It is also helpful to consider the MSP Discussion Paper within a broader public policy context. The initial impetus underlying liberalization of markets for electricity generation was rooted in changing scale economies of production. A number of attempts at deregulation took place world-wide. Some met with considerable success, others foundered. In the latter cases, political and regulatory authorities suspended or retreated from full deregulation. In Ontario, we have an administered market coupled with a purchasing authority (OPA) which attempts to ensure availability of supply,

principally through long term contracts. If the intent of public policy is to gradually liberalize the market and to move Ontario towards a more competitive model, then a broader approach to monitoring, based on aggregated longer term data should be seriously considered.

# Table of Contents

1. Introduction	1
1.1 Background	1
1.2 The Need for a Broader Perspective	2
2. Background	4
2.1 Key Features of the Current Regulatory and Legislative Framework	4
2.2 A Brief History of Market Power Surveillance in Ontario	8
2.3 Market Monitoring: What Have We Learned?	9
3. Evaluation of the Market Surveillance Panel’s Discussion Paper	11
3.1 The Basic Premises of the Discussion Paper	11
3.2 Distinguishing Between the Exercise and the Abuse of Market Power	13
3.3 The Need to Link Market Monitoring to Regulatory Remedies	15
3.4 Withholding and Pricing-up	16
3.5 The “Pricing-Up” Conundrum	17
3.6 Primary Focus Should Be On Long Term Average Prices Rather Than Spot Prices	19
3.7 Bounding the Market Share Susceptible to Market Power Issues	22
3.8 Data Requirements and Regulatory Burden	23
3.9 The “Competitive Standard” for Energy Limited Resources	26
3.10 Potential Impacts of Tests on Bidding Behaviour	27
3.11 Identification of Deficiencies in Market Rules	30
3.12 The Role of Incentive Creation	31
3.13 Conclusions	32
Appendices	
A. Monitoring of Electricity Markets: Overview of the Literature	
B. Curriculum Vitae: Michael Trebilcock	
C. Curriculum Vitae: Adonis Yatchew	

# 1 Introduction

## 1.1. Background

1. We have been retained by Ontario Power Generation Inc. (OPG) to develop our independent reactions to the “Discussion Paper Prepared by the Market Surveillance Panel of the Ontario Energy Board: Market Power Framework for the IESO-Administered Electricity Market”, November 2006, (henceforth, the Discussion Paper).
2. Michael Trebilcock is University Professor and occupies the Chair in Law and Economics at the University of Toronto. He was Research Director for the Ontario Market Design Committee in 1998 and has written and consulted widely on competition law and economic regulation, including issues relating to the restructuring and regulation of the electricity sector. He is the recipient of numerous awards and distinctions.
3. Adonis Yatchew is Professor and Associate Chair for Graduate Studies in the Economics Department at the University of Toronto. He is Editor-in-Chief of the Energy Journal and has consulted for many years on electricity matters. His main areas of research are econometrics and energy economics.
4. The main purpose of the Discussion Paper prepared on behalf of the Market Surveillance Panel (MSP) is to propose a framework for identifying the exercise of market power in the Ontario electricity market. The authors of the Discussion Paper intend to provide a rigorous treatment of how the MSP will determine if market power has been exercised, in particular, whether the action of a market participant has caused the market price to exceed the competitive level.

5. The Discussion Paper outlines three formal tests which would be used in monitoring for the exercise of market power:
  - a “conduct test” which identifies instances where a market participant may have withheld supply from the market or engaged in “pricing-up”;
  - a “market price impact test” which assesses whether the action has had a material impact on the market price;
  - a “profitability test” to determine whether the action has resulted in profits for the participant.
  
6. In broad terms, these tests bear some similarity to screening procedures used in other jurisdictions though, according to the Discussion Paper, in some cases (in particular, energy limited hydraulic generation) their application in the Ontario setting represents a substantial innovation and entails a significant degree of complexity.

## 1.2. The Need for a Broader Perspective

7. The analysis of market power has been the subject of countless technical articles, books and theses. Market power issues in *electricity* markets have also been studied in considerable depth. Such markets embody certain features that make them particularly vulnerable to the exercise of market power. Electricity is not storable, hence the amount that can be delivered at any point in time is determined by the capacity that is available on short notice, the potential for imports and transmission capacity within the system. Once these constraints have been reached, supply becomes effectively inelastic. In most jurisdictions, demand for electricity at any point in time, is also inelastic. This inability to scale back demand or to increase supply beyond certain limits in the short term creates



the opportunity for the exercise of market power. Indeed, unlike most other markets, even relatively small producers can have a large impact on market price.

8. The Discussion Paper defines market power to be the ability and incentive of a market participant to move the market price away from the competitive level. The market clearing price (MCP) is then defined to be competitive if it equals the short run marginal cost of the marginal supplier to the market. Much of the Discussion Paper is devoted to outlining detailed procedures for assessing the exercise of market power based on these short run considerations.
9. We believe that it is more fruitful to situate our review of the Discussion Paper within a broader economic, regulatory and policy framework. In particular, we are interested in what price behaviour would be consistent with a healthy competitive electricity market. For example, does competition entail close matching between hourly prices and short run marginal costs, or are longer term measures more appropriate?
10. From a regulatory point of view, several issues emerge. The Discussion Paper emphasizes that the MSP intends to use the framework “as a tool to assist [it] in monitoring and investigative activities, which do not include mitigation, automatic or otherwise.”<sup>4</sup> Given the explicit absence of any linkages to possible remedies, is the increased regulatory burden for the MSP and for generators justified? Furthermore, is the monitoring and analytic framework likely to contribute to productivity improvements in the short run and to efficient investment in the long run? Finally, the Ontario Energy Board is moving in the direction of performance or incentive based regulation. Should

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<sup>4</sup> Discussion Paper, page 13.

one then expect a more light handed approach to monitoring rather than the detailed, data-intensive approach being advanced in the Discussion Paper?

11. It is also useful to consider market monitoring activities within a broader public policy context. The initial impetus underlying liberalization of markets for electricity generation was rooted in changing scale economies of production. A number of attempts at deregulation took place world-wide. Some met with considerable success, others foundered. In the latter cases, political and regulatory authorities suspended or retreated from full deregulation. In Ontario, we have an administered market coupled with a purchasing authority (OPA) which attempts to ensure availability of supply, principally through long term contracts. Is the proposed approach to monitoring consistent with moving Ontario towards a more regulated model or towards one where competitive forces play a greater role?

## **2 Background**

### **2.1. Key Features of the Current Regulatory and Legislative Framework**

12. Since the decision was made by a previous Ontario government in the mid-1990s to move towards a more competitive electricity market in Ontario, particularly with respect to generation, following recommendations to this effect by the McDonald Task Force, it has been recognized that market power poses a significant potential problem in this market, in part because Ontario Power Generation accounts for such a large share of generating output in this market (at the present time in excess of 70 percent of provincial generation, and at market opening in May of 2002 about 77 percent of provincial generation), and in part because even generators with a small overall market share can often exercise market

power on price-setting margins. This is often a result of the fact that demand cannot easily be reduced in the short run in response to high prices, nor can supply readily be increased in the short run (demand and supply are inelastic).

13. Initially these concerns were addressed in the form of the Market Power Mitigation Agreement (MPMA) entered into between Ontario Power Generation and the Ontario Government, and given legal effect through conditions attached to OPG's license by the Ontario Energy Board. This agreement adopted two broad approaches to the concerns over excessive market power in the Ontario electricity market. The first response was a structural one, under which OPG was required to divest itself of about 35 percent of price-setting capacity within 3½ years of market opening and about 35 percent of total generation capacity within 10 years of market opening. Pending these divestitures, prices which OPG was entitled to realize in the market were subject to a rebate mechanism which required OPG to rebate to the Independent Electricity System Operator (IESO) any prices realized in excess of an average of \$38 per MWh with respect to 90 percent of its generation output (subject to elimination of the rebate obligation on the output of generation capacity that was divested).
  
14. As the Market Surveillance Panel of the OEB reports in its Discussion Paper of November 2006 (at page 9), the current government has committed to maintaining OPG's generating assets under public control. The policy of divesting assets is no longer in force and the MPMA effectively expired at the end of 2004. Under a regulation promulgated under the Ontario Energy Board (Ontario Regulation 53\05), the price OPG receives on prescribed assets is regulated with periodic price adjustments made by the OEB. Prescribed assets include baseload hydro electric and nuclear plants with an allowance for baseload hydroelectric generation above 1900 MW to receive the market price. The current contracts effectively fix the price for prescribed assets to OPG at

between \$33 and \$49.50 per MWh. Prescribed assets which receive these fixed prices account for about 56 percent of OPG's production. In the case of non-prescribed assets, OPG is required to rebate to the IESO the difference between the market price and \$47 per MWh on 85 percent of the output of its non-prescribed assets. Non-prescribed assets subject to this rebate arrangement account for about 35 percent of OPG's production.<sup>5</sup> With respect to its non-prescribed generating facilities, paragraph 27 of Schedule B to the Regulation states that "OPG shall maximize their value for the people of Ontario by operating those facilities in response to the price signals of the IESO-administered markets." OPG's conduct in the IESO-administered markets is subject to review by the Market Surveillance Panel of the Ontario Energy Board.

15. The mandate of the Market Surveillance Panel of the Ontario Energy Board (formally of the IESO) is principally set out in the *Electricity Act, 1998*. Section 37(1) states: "The Market Surveillance Panel may investigate any activity related to the IESO-administered markets or the conduct of the market participant."
  - Section 38(1) states: "If the Market Surveillance Panel submits a report to the IESO and the Board under section 37 that contains recommendations relating to the abuse or possible abuse of market power, the IESO shall, within 30 days after receiving the report, inform the Board what action the IESO has taken or intends to take in response to the report."
  - Section 38(2) provides: "After receiving the report of the Market Surveillance Panel and after receiving any information provided by the IESO under subsection 1, the Board may conduct a review to determine whether the market rules or the license of any market participant should be amended."

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<sup>5</sup> See Discussion Paper, pages 9 and 10.



Board shall advise the Minister with respect to any of the following matters if requested by the Minister to do so or if the Board considers it advisable to do so: 1) any abuse or potential abuse of market power in the electricity sector; 2) the circumstances that are capable of giving rise to unintended outcomes or effects that operate contrary to the interests of competition.” Furthermore, Section 70 of the *Ontario Energy Board Act* vests in the Ontario Energy Board broad powers to prescribe conditions attaching to market participants’ licenses, including licenses that must be obtained by every generator.

18. We derive some simple propositions from this brief review of the legislative and regulatory framework for addressing concerns over market power in the Ontario electricity market: a) in the case of the dominant generator (OPG), price regulation administered by the OEB and rebate obligations apply to in excess of 90 percent of its generation output; b) with respect to both OPG and other market participants (in particular, in our context, other generators) on electricity transacted through the IESO-administered spot market, the Market Surveillance Panel of the OEB is empowered to monitor the market for evidence of abuse or potential abuse of market power and where such evidence exists to initiate formal investigations into the activities or conduct in question; c) remedies contemplated by the legislation for substantiated instances of abuse of market power are either amendments to the market rules or amendments to the license conditions of market participants, as prescribed by the Ontario Energy Board.

## 2.2. A Brief History of Market Power Surveillance in Ontario

19. Since the Market Surveillance Panel was constituted prior to the opening of the electricity market in Ontario in May 2002, it has published eight semi-annual monitoring reports. In these semi-annual reports (the most recent covering the period

of May 2006 to October 2006), the MSP has examined apparent anomalous outcomes in the IESO-administered markets, principally by focusing on both high-priced and low-priced hours. The MSP has defined high-priced hours as hours where the hourly Ontario electricity price (HOEP) exceeds \$200 per MWh, and low-priced hours as hours where the HOEP has been below \$20 per MWh.

20. In its detailed examination of each such incident, it has not found any case of abuse or potential abuse of market power, nor has it launched any formal investigations. The Reports have at times identified various deficiencies in market rules that have induced inefficient conduct in the market. Indeed, the MSP has explicitly stated that: “Our explanation and analysis of anomalous outcomes has led us to recommend changes in both market rules and operational procedures. Most of our recommendations have been implemented and have eliminated gaming opportunities, increased transparency and enhanced efficiency.” (Discussion Paper, page 1.)

### 2.3. Market Monitoring: What Have We Learned?

21. Since a number of electricity markets around the world have been opened up to competition, at least with respect to generation, over the past two decades, significant experience has accumulated with respect to various aspects of market monitoring. This experience has been insightfully reviewed by highly respected and experienced electricity market analysts. In Appendix A to our report, we summarize some of the key conclusions reached by several of these analysts. In the following we have distilled what we consider to be the essential ones relevant to our review of the Discussion Paper:

- A. It is neither possible nor desirable for the regulator to prevent firms from exercising unilateral market power. Regulatory mechanisms that attempt to prevent all exercise of unilateral market power can introduce market inefficiencies that cause more economic harm than the market power they are attempting to prevent.
- B. Monitoring needs to be linked closely to regulatory remedies.
- C. Experience suggests that the most important role of the market monitor is to identify problems with market rules and to seek solutions to them.
- D. In a healthy electricity market, prices, on average, should approximate the long run marginal cost of producing electricity. This ensures that prices are sufficient to encourage sufficient supply, but not so high so that they yield supra-competitive returns to producers. Excessive focus by the market monitor on short-run marginal cost pricing can lead to insufficiency of generation resources and even have an adverse impact on reliability.
- E. Market behaviour which alters dispatch so that it is inefficient, that is, so that higher cost units are generating electricity, while lower cost units remain idle, is inefficient from a societal point of view. A central role of the market monitor and the regulator is to limit such behaviour to the extent possible. Examples of such behaviour include economic and physical withholding of capacity.
- F. Bidding behaviour which increases prices without causing inefficient dispatch is not inefficient in the conventional economic sense. For example, while



“pricing-up” results in transfers of income from consumers to producers, it does not necessarily lead to inefficient allocation of resources. Indeed, to the extent that pricing-up reflects scarcity of supply, it sends an important signal to investors who may be seeking opportunities to enter the market profitably.

22. Experience with electricity market liberalization has varied considerably across jurisdictions. Moreover, market designs and market rules continue to evolve. Thus, it would be premature to assert that there exists a “received wisdom” with respect to electricity market liberalization in general, and market monitoring in particular. Nevertheless, there is accumulating evidence in support of each of the above propositions.

### **3 Evaluation of the Market Surveillance Panel’s Discussion Paper**

#### **3.1. The Basic Premises of the Discussion Paper**

23. In the Introduction to its Discussion Paper, the MSP states that in each of the semi-annual reports it has released it has sought to meet one of its key objectives: to identify and explain anomalous outcomes in the IESO-administered market and to recommend, where appropriate, changes in both market rules and operational procedures to eliminate gaming opportunities, increase transparency, and enhance efficiency.
24. The MSP also states that its second key objective is to investigate instances of abuse or potential abuse of market power and to make recommendations where these are

found to exist. As noted earlier, no such instances have been found to date and no investigations launched.

25. The MSP then states that the Discussion Paper concerns itself with the exercise of market power pricing behaviour that is distinct from the more serious abuse of market power but still relevant to an assessment of the state of competition in the market. The Discussion Paper sets out the general framework the Panel proposes to employ in this respect. The Panel states that the framework is intended to codify the practices developed by the MSP to enable it to infer that there has been an exercise of market power in the IESO market.
  
26. Unlike related assessments which may be conducted in some other jurisdictions, the framework is not intended to be the basis for an automatic mitigation process or any sanctioning activity. Its purpose is simply to help the MSP gain a better understanding of both the conduct of market participants and events that occur in the market. The MSP notes later in the Discussion Paper that

“in our monitoring to date, we have occasionally found instances of behaviour that we felt warranted discussion with market participants and we have pursued such discussions to gain a better sense of the considerations driving such behaviour. We have done so without a formal framework, although we are being guided by concepts similar to those proposed in this paper. While this has worked reasonably well to date, we believe that both the Panel and market participants will benefit if there is a more rigorous and transparent framework that is understood and accepted by market participants.”

27. The Panel goes on to note that the second reason it feels that a formal framework will be useful has to do with its interpretation of its investigative mandate. The Panel notes that it has the statutory authority to investigate any activity related to the conduct of a market participant (section 37(1) of the *Electricity Act, 1998*). Ontario Energy Board Bylaw No. 3 directs the Panel's attention to inappropriate or anomalous conduct by a market participant, including abuse of market power (here the Panel notes the specific reference to abuse of market power in section 38(1) of the *Electricity Act, 1998*). The Panel states:

“We have consistently emphasized the distinction between the exercise and abuse of market power. We believe that the exercise of market power is not necessarily abusive... nonetheless, if our monitoring revealed a persistent, sustained and substantial exercise of market power... this might well be considered abusive and be the basis for an investigation under the *Act*.” (p. 12)

### 3.2. Distinguishing Between the Exercise and the Abuse of Market Power

28. We raise a number of questions with respect to these basic premises of the Panel's Discussion Paper. First, the distinctions that it apparently draws between a) anomalous outcomes, b) abuse of market power, and c) exercise of market power, are highly opaque. What are the criteria that determine whether a market outcome is “anomalous”? While the Panel says that it has consistently emphasized the distinction between the exercise and abuse of market power, the distinction that it draws in this respect is far from apparent in the paper. Indeed, it states that the

Discussion Paper codifies existing practices of the Panel, hence implying that it has already been monitoring for exercise of market power of the past four years (and found no such instances). We note in this respect that while section 37(1) of the *Electricity Act* authorizes the Market Surveillance Panel to investigate any activity related to the IESO-administered markets or the conduct of a market participant, section 78(1) of the *Electricity Act* authorizes the Market Surveillance Panel to submit reports to the IESO and the Ontario Energy Board containing recommendations relating to the abuse or possible abuse of market power and contemplates that such recommendations may lead the Board to conduct a review to determine whether the market rules or the licence of any market participant should be amended, but such power seems to be restricted to cases where an abuse or possible abuse of market power has been found.

29. Under Canadian competition law, abuse of dominance is a reviewable practice under sections 78 and 79 of the *Competition Act*. The Competition Tribunal has held that abuse of dominance entails “predatory, exclusionary, or disciplinary conduct” (an interpretation recently affirmed by the Federal Court of Appeal in *Canada Pipe v. Commissioner of Competition*). The Tribunal has recognized, as has the Commissioner of Competition in abuse of dominance guidelines issued by the Competition Bureau, that simply charging “excessive” prices is by itself not an abuse of dominance, but rather conduct designed to undermine the effectiveness of competition in a relevant market through anti-competitive practices. This is also the position taken by U.S. antitrust authorities under section 1 of the *Sherman Act* dealing with monopolization and attempted monopolization, although the European Commission under article 82 of the *Treaty of Rome* (and the European Court of Justice) have interpreted the EU’s abuse of dominance provisions as including the charging of “excessive” prices.

30. In part the disinclination of Canadian and U.S. antitrust authorities to interpret abuse of dominance provisions in competition or antitrust law as encompassing supra-competitive pricing relates to the fact that competition authorities in neither country view their functions as including those of an ongoing price regulator, which persistently excessive pricing, in the absence of effective competition, may require, as opposed to restoring effective competition in a market by eliminating anticompetitive practices.

### 3.3. The Need to Link Market Monitoring to Regulatory Remedies

31. This implicates another source of obscurity in the Panel's Discussion Paper which relates to remedies for the exercise of market power (accepting, for the sake of argument, the distinction the Panel draws between the exercise of market power, the abuse of market power, and anomalous market outcomes). While the Panel states, in the introduction to its Discussion Paper, that "unlike related assessments which may be conducted in some other jurisdictions, it is not the basis for an automatic mitigation process or any sanctioning activity, its purpose is simply to help the MSP gain a better understanding of both the conduct of market participants and events that occur in the market," later (as we note above) the Panel states that "if our monitoring revealed a persistent, sustained and substantial exercise of market power, this might well be considered abusive and be the basis for an investigation under the *Act*."
32. This ambiguity as to whether supra-competitive pricing is or is not an abuse of market power (in the absence of any judicial interpretations of this phrase in the *Electricity Act* or the *Ontario Energy Board Act*) needs clarification, not only in terms of when

supra-competitive pricing constitutes an abuse of market power, but also what remedies are likely to flow from such a finding.

33. As a number of respected authors have emphasized in their papers<sup>6</sup>, clear *ex ante* specification of remedies for exercises of market power causing inefficiency are of critical importance to market participants in ordering their conduct appropriately.

### 3.4. Withholding and Pricing-up

34. In the body of its Discussion Paper, the MSP attempts to provide a more precise definition of what it regards as an inappropriate exercise of market power by focusing on two practices, withholding and pricing-up. The Panel states that in essence, the exercise of market power involves either the restriction of supply available to the market (withholding) or pricing above the relevant measure of cost by the marginal supplier in the market (pricing-up). Both have the effect of transferring wealth from consumers to suppliers. Withholding has the further effect of causing relatively high-cost suppliers to be called to market to replace withheld capacity. This inefficient choice of suppliers raises the aggregate cost of supply to the market.
35. With respect to withholding, the Panel notes that there are a number of ways in which supply may be withheld from the market: a) supply can be offered at prices that are higher than cost with the consequence that higher cost but lower priced offers are selected instead (economic withholding); b) supply may simply not be offered into the market, thus requiring the market to turn to higher cost sources (physical

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<sup>6</sup> See, for example, the papers by Larry Ruff and Frank Wolak for which we provide selective synopses in the Appendix.

withholding); c) supply that can be offered for a limited number of hours (such as hydro electricity produced from limited supplies of water) may be offered to the market in such a way as to increase the market price in peak periods without substantially reducing the market price in off-peak or shoulder periods. Where a generator has a portfolio of generating facilities, withholding, by raising the market clearing price (MCP), can increase the returns to plants offered into the market beyond any returns foregone from plants withheld.

### 3.5. The “Pricing-Up” Conundrum

36. With respect to economic and physical withholding, we fully understand that such practices can result in inefficient operation of the market by leading to inefficient dispatch as higher cost sources of energy are called to market before lower cost resources. In addition, they also result in a wealth transfer from consumers to generators. However, to us the case against pricing up behaviour is not nearly as straightforward.

37. According to the Panel, where the marginal supplier increases its offer above its cost, it effectively prices up to the next highest alternative. If demand is inelastic, this pricing up does not change dispatch or lead to inefficient operation of the market, but it does result in a wealth transfer from loads as a group (consumers) to generators. However, the Panel goes on to note that

“It is a characteristic of electricity markets that when available resources are barely adequate to meet demand (referred to as scarcity conditions), market prices can rise to very high levels.... That is, a high price may be the means by which the market

rations a limited available supply. In this case, a high price simply reflects the scarcity value of electrical energy. High prices alone do not imply that there has been an exercise of market power.<sup>7</sup> To the extent they reflect scarcity, such prices are an essential signaling device to ensure that the market operates effectively both in the short term and in the long term... However, scarcity brings with it an increased opportunity to exercise market power.” (p. 6)

38. Later in its Discussion Paper, the MSP states that “the task of the Panel in explaining price spikes is to understand whether the prices involved result strictly from scarcity, or whether withholding or pricing up is also a factor.” (p. 12). Again, we are mystified as to the basis of the distinction between scarcity pricing and “pricing up”. Here we note the importance of scarcity pricing in inducing appropriate behavioural adjustments on the demand side and investment decisions on the supply side.
39. This ambiguity is perpetuated throughout the paper. For example, elsewhere in the paper, the MSP states that “we use the term ‘pricing up’ to refer to a situation in which the marginal supplier raises offer prices above its incremental costs... Scarcity conditions and resulting higher prices may or may not be accompanied by the exercise of market power.” In examples provided in Figures at pages 19 and 20, there is pricing up by either marginal generators or price-setting generators but no change in dispatch, although there is an increase in the market clearing price. The Panel says that this will likely constitute an exercise of market power, even though it has not led to any inefficiency in the market through the substitution of higher costs for lower cost generation.

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<sup>7</sup> See, for example, Steven Stoft who states: “Market power cannot be proven by observing high prices, but it can be proven by observing a quantity of output withheld.”, *Power System Economics, Designing Markets for Electricity*, Wiley, NY, 2002, page 370. See also the abridged synopses provided in the Appendix of papers by Joskow, Ruff, Twomey et al, and Wolak, all of whom make this point.



40. We emphasize here that the operator of a price-setting plant with market power (the ability to price up to the next most highest priced source of supply) will find it equally rational to do this for profit maximizing reasons whether or not it possesses a portfolio of infra-marginal plants.
41. The notion of pricing up that is being advanced is relative to short run marginal costs. However, we are not aware of any market in which there are strong competitive forces where, if given the opportunity, a supplier will bid his short run marginal costs rather than the price that the market will bear. Indeed, such a strategy is inconsistent with long run survival.

### 3.6. Primary Focus Should Be On Long Term Average Prices Rather Than Spot Prices

42. Our concerns as to what forms of conduct the Panel considers embraced by the exercise of market power that if persistent or serious enough may constitute an abuse of market power is compounded by the basic test that the Panel adopts for assessing the exercise of market power. The Panel, in its Discussion Paper, states “that a market participant has market power if it has both the ability and profit incentive to move the market price away from the competitive level. The competitive price level is the price that would prevail in equilibrium in an idealized perfectly competitive market. Under perfect competition, the price at which a competitive market clears is equal to the short-run marginal costs to the marginal supplier. It is at least as great as the marginal supplier’s average variable cost.” (p. 16)

43. However, as a number of respected market analysts have observed, pricing at short-run marginal cost is not a sustainable pricing policy, for the simple reason that it does not cover long-run marginal costs (in effect, fixed costs), and moreover it is not observed in most non-electricity markets.<sup>8</sup>
44. Moreover, by focusing on the relationship between price and cost in isolated hours such as peak hours where the imbalance between supply and demand may be acute, as the Panel proposes throughout its Report and indeed as it has done in the eight semi-annual reports it has issued to date, scarcity pricing, which it purports to accept, is almost always likely to prove problematic.
45. An alternative approach would focus much less on isolated price spikes and much more on whether prices in an electricity market over some more representative period of time, e.g., from a day to a year, more or less equate with long-run marginal costs. By avoiding a preoccupation with ephemeral pricing behaviour and focusing more on longer term relationships between prices and long-run marginal costs, the Panel would be focusing on the relationship of much more enduring concern to both the demand side and the supply side of the Ontario electricity market.
46. In this respect, we note in its most recent semi-annual report for May 2006 to October 2006, that Ontario became the lowest priced market of the neighbouring inter-related markets surveyed (page 33): the Midwest market, the Northeast market, the New York market, and the Pennsylvania, New Jersey, Maryland (PJM) market, all of which involve extensive direct and indirect trading with the Ontario market in terms of imports and exports, and where price differences tend to equalize with residual

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<sup>8</sup> See examples in the Appendix offered by Larry Ruff on the market for tomatoes or resale homes.

differences, reflecting, for the most part, only transaction costs, transmission costs and transmission constraints (Panel Report, November 2005-April 2006, p. 23), thus in turn suggesting that, at first blush, Ontario prices do not exceed the long-run marginal costs of producing electricity in the province, assuming these neighbouring markets as a whole are workably competitive.

47. If prices in the Ontario electricity market are found to be systematically above long-run marginal costs averaged over some reasonably representative period, then the issue of remedies raised above comes centrally into focus. If competitive forces are not effectively disciplining the IESO-administered spot market in Ontario, then rather than ad hoc interventions by the Market Surveillance Panel in particular incidents of alleged exercise of market power, there is probably no alternative but to consider a more systematic form of intervention, such as price caps or performance-based price regulation for the Ontario electricity market as a whole. If, on the other hand, the long-term policy objective is to move the Ontario electricity market away from a centrally-administered or regulated market to a competitive market, interventions by the Market Surveillance Panel should be influenced by patterns of conduct that are consistent with this long-term objective. It is not clear to us that scarcity pricing is appropriately a matter of concern if this is the long-term objective. While the Panel is silent as to what remedies it contemplates for unacceptable exercises of market power (if any), the issue of remedies situated in the context of the long-term policy objectives for this market cannot be avoided.
  
48. In light of these general issues relating to market power mitigation in electricity markets, in the next part of our study we turn to a number of more specific issues arising out of the MSP's Discussion Paper. In particular, we focus on the issue of what proportion of the market is susceptible to application of the MSP's proposed

framework; its proposed tests for identifying inappropriate exercises of market power by reference to a) conduct, b) pricing, and c) profitability, with respect to non-energy limited generation, imports, and energy-limited generation; and assess the burdens of data requirements for market participants, analytical burdens for the Market Surveillance Panel, and error costs against potential benefits from the analytical enterprise proposed by the MSP in its Discussion Paper. Our study concludes by revisiting some of the general issues we have raised in the first three parts of this study in light of this cost-benefit analysis.

### 3.7. Bounding the Market Share Susceptible to Market Power Issues

49. Although prices in the Ontario wholesale electricity market are determined by supply and demand, the *Electricity Restructuring Act, 2004* incorporates certain specific provisions in order to impart a considerable degree of stability to prices that are ultimately paid, particularly by smaller users. Under these regulations, the overwhelming majority of Ontario generation receives prescribed or predetermined rates for its output. Among these assets are OPG nuclear and baseload hydro facilities. Although, in principle, loads pay the market price of electricity, each month they receive an adjustment (the “global adjustment”) which reflects the difference between the market price and the set prices that are paid to regulated or contract generators.
  
50. In addition, OPG is required to pay rebates on revenues above a set price for its “non prescribed” or unregulated generation. The rebates are paid on a quarterly basis. The set prices apply to approximately 85% of OPG’s “unregulated” generation. Thus, only about 15% of OPG’s unregulated assets receives the market price.

51. As a result of these various arrangements, actual wholesale market prices have a modest impact on costs ultimately borne by consumers. According to IESO calculations, over the period November 2005 to April 2006, about 81% of Ontario electricity consumption was provided under one or another form of fixed price contract. Put another way, a \$1 per MWh increase in HOEP in all hours would result in a \$0.19 per MWh increase in the Ontario consumer's energy bill.<sup>9</sup>
52. In view of the powerful effect that contracts and regulations have in dampening the impacts that spot price levels and volatilities have on the ultimate prices paid, it would seem that elaborate analysis of pricing behaviour in the spot market, as is being proposed in the Discussion Paper, is misplaced.

### 3.8. Data Requirements and Regulatory Burden

53. The Discussion Paper outlines in considerable detail the methodologies that will be applied to implement the tests to three categories of supply: fossil units, imports and energy limited generation (in particular, hydro assets). In each case, three tests would be performed: the conduct test, the price impact test and the profit test. The tests are data-intensive, require regular re-calibration as well as a substantial degree of judgment.

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<sup>9</sup>“The Role of Fixed Price Contracts and the Global Adjustments in Mitigating Price Changes to Consumers”, <http://www.theimo.com/imoweb/pubs/consult/se17/se17-20061019-Fixed-Prices-and-Hedging.pdf>. See also “Quick Takes, Electricity Pricing: OPG Rebate/Global Adjustment”, October 18, 2006, [http://www.ieso.ca/imoweb/pubs/training/QT19\\_pricing.pdf](http://www.ieso.ca/imoweb/pubs/training/QT19_pricing.pdf).

54. To determine the cost functions of generating units, the level of detail with respect to short term costs required by the MSP far surpasses that required in typical cost of service regulation. The proposed additions to the data catalogue which will be required by the MSP include detailed unit-level data on start-up costs, minimum run times and minimum shut-down times for all fossil facilities; heat rates for fossil and nuclear units; variable O&M costs for all fossil and nuclear units; projected outage rates for newer fossil units; and detailed production function information on hydraulic facilities (Discussion Paper page 87).
55. Moreover, since outage rates can be affected by the level of maintenance and capital programs, it may be that in the future, the MSP will find that it needs to examine these categories of costs in a similar level of detail in order to perform equally thorough assessments of outages which may be suspected of resulting from physical withholding.
56. For energy limited hydraulic generation, the level of detail that would be required to fully assess the exercise of market power would be particularly onerous. To determine whether water resources have been used optimally from a system point of view requires the solution of a complex intertemporal optimization problem. Given the uncertainties surrounding various key variables, there is even a stochastic aspect to the optimization problem. Many practical considerations and constraints need to be taken into account including “storage capabilities, inflows, market prices for both energy and operating reserve, the conversion efficiency for water to energy over the entire operating range of the units involved, lake level and river flow limitations and upstream or downstream relationships.” (Discussion Paper page 61.)

57. Given the complexities in solving the optimization problems associated with energy limited hydraulic generation, the MSP is proposing a relatively simple initial conduct test procedure. In particular, the test for hydroelectric plant would be based on the “water allocation efficiency ratio” (WAER) which is the ratio of actual revenue generated on a given day to the “unconstrained ideal allocation”, that is the revenues that would be earned if the facility were used at the highest price hours.
58. The WAER can vary dramatically over time -- both in terms of its level and volatility -- as a result of changing constraints. Thus, in and of itself, it provides a poor indicator of the exercise of market power. The Discussion Paper then proposes a series of further steps that need to be taken in attempting to determine whether the low output is a result of the exercise of market power.
59. Thus, though the calculation of WAER is relatively straightforward, the additional data and analysis required to investigate once the conduct test has been triggered is very detailed and includes:
- production function data for each hydraulic unit;
  - constraints on production for each plant resulting from water level or flow restrictions;
  - time delays for water to travel between individual plants on a river system.

### 3.9. The “Competitive Standard” for Energy Limited Resources

60. For energy limited resources there would seem to be an ambiguity with respect to the “competitive standard” to which they should be held, even under idealized assumptions. Consider first non energy limited resources such as conventional fossil generation. The competitive standard proposed by the MSP is that bids associated with such resources should approximate short run marginal costs (or more precisely, short run average incremental costs). For the owner of such resources, the information set upon which the bid is based requires knowledge only of the firm’s own costs. The function of the market or dispatcher is to determine which units should operate to minimize overall system costs.
61. For energy limited resources, optimal allocation depends on opportunity costs (rather than short run marginal costs). Ideally one would like such resources to run at those times at which they serve to minimize overall system costs. Prior to the inception of markets in electricity, these decisions were made by Ontario Hydro through a central planning process. In a market setting, however, decision making is decentralized. Suppose, for the moment, that optimal allocation of energy limited hydraulic resources depended only on anticipated market prices. Then the idealized competitive standard would seem to be that owners of such resources should bid them at marginal cost during the highest price hours. However, various constraints and interrelationships among hydraulic plants imply that optimal allocation cannot be determined “solely by anticipated market prices” (Discussion Paper, page 60). Thus, bidding by an owner which would lead to the competitive ideal of minimum system costs, could potentially require knowledge and prediction of the circumstances and behaviour of other related market participants.
62. Thus, unlike in competitive markets with private information and decentralized decision making, the information set which would be required by owners of energy



limited resources so that they act in a way which minimizes overall system costs would seem to be much broader. Failure to bid resources in a way which contributes to minimization of overall system costs could be a result of an attempt to manipulate the market, failure to correctly predict the actions of market participants, or failure to correctly solve the system-wide cost minimization problem. Paradoxically, in the latter case, it would seem that the firm is expected to act at once as a competitive market participant and as a central market planner.

### 3.10. Potential Impacts of Tests on Bidding Behaviour

63. While the Panel states that its intent is to attain a better understanding of the marketplace, it is important to recognize that the proposed analytic framework has the potential to have effects on behaviour, some of which may be unintended or undesirable. For example, generators fearing that pricing up could be construed as inappropriate exercise of market power may be discouraged from bidding into scarcity markets at precisely the times that their supply is most needed. On the other hand, failure to bid could be construed as withholding. Alternatively, generators could seek out fixed period contracts in order to avoid the spot market, thus compromising the efficacy of an essential balancing mechanism. Such developments would be contrary to the OPA mandate to reduce reliance on procurement.
64. In order to further appreciate how the tests being proposed can lead to unintended consequences, it is useful to examine the conduct test in some detail. Let us begin with the *theoretically* appealing proposition that if market participants consistently bid their short term marginal costs, then one has a competitive market. (For the

moment we are setting aside the possibility that this may be insufficient to ensure reliability and continued investment in the industry.) The MSP obtains estimates of these short term costs in two ways: first, a competitive “reference price” is computed “based on a unit’s accepted offers ... over the previous 90 days.” Second, the average incremental cost (AIC) is calculated as a function of the expected number of hours the unit will be in operation. AIC consists primarily of fuel and startup costs. In addition, the maximum average incremental cost (MAXAIC) is calculated as the maximum value of the AIC function which occurs at the minimum number of hours of operation. (See Discussion Paper, Figures 3-1, 3-2 for illustrations.) The conduct test uses these two cost estimates to identify circumstances where economic withholding or pricing up may have occurred.

65. In particular, the conduct test compares the offer price of each non-energy limited generation unit to two threshold measures: the unit’s (historically based) reference price plus a statistically determined margin; and the MAXAIC. If the offer price exceeds the larger of these two measures, then further investigation is triggered. The reference price threshold being proposed equals the reference price plus two times the standard deviation of the offer price over the previous 90 days. The design of this reference price threshold ensures that the probability of it being triggered should be small (on the order of 2 per cent under idealized circumstances<sup>10</sup>), thus also ensuring that the monitoring activities are not seen to be excessively intrusive or overbearing.
  
66. Let us consider the incentives created by this focus on short term extreme or anomalous bids. A profit maximizing generator, acting in the interests of its shareholders, may seek to steadily increase bids over time so that its reference price,

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<sup>10</sup> If offer prices are normally distributed, then the probability mass lying more than 2 standard deviations above the mean is approximately 2%.

(which is an average of its accepted bids), increases as well. One might argue that this inclination would be mitigated by competition in the marketplace (high bids could mean lost sales), but if the market were truly competitive to begin with, then market monitoring would be of limited value, if not superfluous.

67. Furthermore, there is also an incentive for a generator to increase the *volatility* of its bids, because this would increase the standard deviation of offers, which in turn would expand the range of future bids that would not come under scrutiny. It is perhaps worth noting here that a generator could inflate its volatility estimate by increasing the frequency of high and/or low bids.<sup>11 12</sup>
68. If such bidding strategies were pursued, then one might observe an increase in *average* bids and market clearing prices without a material change in the frequency and pattern of *anomalous* bids and prices. This would not be a desirable outcome as it is average prices and bills that are of predominant importance to electricity consumers, rather than price spikes that occur two or three percent of the time.
69. Similar problems could emerge with conduct tests for energy limited hydraulic resources which are based on the water allocation efficiency ratio. For any given day, the WAER would be deemed below its historical threshold if it is lower than say 98

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<sup>11</sup> A partial analogy may be formulated by considering highway speed limits and the monitoring thereof. If the posted speed limit is 100 km per hour, but it is widely known that police only detain drivers exceeding 130 km per hour, then, (setting personal preferences and safety issues aside for the moment) there is little disincentive to exceed the speed limit and to travel at speeds as high as 129 km per hour. Allow for the moment that limited resources permit law enforcement to apprehend only the most egregious violators, say those traveling at speeds more than 2 standard deviations above the mean, that is (under normality assumptions), the 2% of drivers traveling at the highest speeds. Then a proportionate increase in the number of fast *and* slow drivers will increase the standard deviation and therefore the top speed at which drivers can travel without risk of being stopped. For example, the speed at which police apprehend drivers might increase from 130 km per hour to 140 km per hour even if average travel speeds remain unchanged.

<sup>12</sup> As a technical matter, the volatility estimate could be increased without changing average bids. Moreover, gradual changes in the shape of the distribution of bids (e.g., moving away from a normal distribution) could also be exploited to expand the range of bids which would come in “under the radar”.

percent of the values over the past 90 days, and if is less than 85 percent of the average value over a similar period. If the owner is intent on market manipulation, then he could gradually lower average realized revenues over time without triggering the conduct test.

### 3.11. Identification of Deficiencies in Market Rules

70. Anomalous prices may be harbingers of inherent problems with market rules or architecture. But in this case, it seems unlikely that the granular, unit-level data that are required to implement the framework in the Discussion Paper, would be needed to identify general faults of market design. Indeed, according to the Discussion Paper (page 1), the MSP believes it has been successful at identifying and correcting problems of market rules using the data presently being provided. Furthermore, there are other mechanisms which would facilitate the discovery of market deficiencies and imperfections, among them, regular surveys of market participants to solicit their views on market performance and new or emerging issues requiring modifications to market rules.
  
71. As the title of the Discussion Paper plainly states, its purpose is the “Identification of the Exercise of Market Power”. While identifying market power may, in some cases, assist in the detection of market rule deficiencies, it would be inaccurate to claim that market power has been the chief culprit underlying electricity market failures. For example, although a number of studies have concluded that during the 2000-2001 crisis in the California market certain sellers exercised significant market power, the problems that emerged were fundamentally a consequence of market rules and design – in particular, the virtual absence of long term contracts which would have stabilized

power bills, the freeze on retail prices under which large utilities were required to sell to customers at 6 cents per KWh while paying market rates of 10 cents per KWh, and the presence of various loopholes which permitted traders to exploit regulatory arbitrage opportunities.<sup>13</sup>

72. In our view, identification of deficiencies in market rules, particularly those that create incentives that are incompatible with or contrary to improving overall market performance and efficiency, is an objective which surpasses in importance that of identifying the exercise of market power at ever more refined levels.

### 3.12 The Role of Incentive Creation

73. Monitoring energy limited hydraulic resources provides a particularly salient example of asymmetry of information between the regulator and the regulated entity. If a hydraulic generator is intent on concealing the exercise of a modest degree of market power, the complexities of the underlying resource allocation and scheduling problem would seem to afford it many opportunities to escape detection. (Egregious violations should continue to be detectable using current methods.) One might think that this is an argument in support of ever more detailed and refined analysis by the market monitor. In our view, it provides a very powerful argument for seeking incentive based approaches to ensure that the incentives of the firm are more closely aligned with the objective of system wide cost minimization.

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<sup>13</sup> See “The Trouble With Electricity Markets: Understanding California’s Restructuring Disaster”, Severin Borenstein, *Journal of Economic Perspectives*, Vol. 16, No. 1, Winter 2002, pages 191-211.

74. Indeed it is these kinds of arguments that have provided the impetus for incentive based regulation: under cost based regulation, the regulator attempted to ascertain as accurately as possible the true costs of a firm. The approach was found to be lacking, and economists and regulators sought mechanisms which would create incentives for the firm to minimize costs without having the regulator engage in an elaborate discovery process.
75. In the present context of an “administered market”, primary focus should be on creating and sustaining incentives for efficient behaviour. This, in turn would entail continuous monitoring and refinement of market rules, particularly in areas where deficiencies in them have been revealed.

### 3.13. Conclusions

76. Market monitoring in electricity industries involves systematic analysis of market behaviour to identify flaws in market rules, design or structure that can lead to inefficiency, strategic or opportunistic behaviour, reliability issues and suboptimal investment.
77. In analyzing market power issues, the monitor typically tries to establish benchmarks for wholesale prices. In workably competitive markets average prices over time should reflect long term marginal costs. Under such circumstances, prices are high enough to attract investment but not so high as to accord investors supra-normal returns. Thus, one would expect monitors to expend considerable effort in developing benchmarks of long term marginal costs and assessing market performance against these.

78. The MSP Discussion Paper proposes to devote considerable regulatory resources (both theirs and those of market participants) to the formalization of a process for examination of spot market prices which would be compared to short term benchmarks based upon short term marginal costs (and in the case of energy limited hydraulic resources, short term revenues). This seeming imbalance in focus between short term and long term costs and prices is perhaps in part due to the relatively greater ease with which short term costs can be estimated. For example, short term marginal costs for fossil plants can be approximated reasonably well in two ways: by observing fuel prices which constitute the vast majority of short run marginal costs; and, by observing bidding behaviour at times of excess capacity (that is, during off-peak hours) when one would expect rational market participants to bid their short run marginal costs. In contrast, long term marginal costs are more difficult to estimate, but would provide crucially more important reference points for determining the overall robustness of the market.
79. Actually, the focus of the proposed tests is narrower than short term marginal costs pricing *per se*. The focus is on anomalous bids and prices, (that is, those which occur with low frequency). What is unclear from the Discussion Paper is whether bidding behaviour that departs substantially from short run marginal costs, but remains within the specified statistical boundaries (i.e., within two standard deviations of recent accepted bids for typical fossil units) would cause any concern for the market monitor. If not, then this may be an indication that the MSP recognizes that adherence to short term marginal cost pricing is not necessarily conducive to attracting investment to the industry on a competitive basis. On the other hand, the Discussion Paper also states that pricing-up, even if there is no change in dispatch, “would likely constitute an exercise of market power”, (page 20). Certainly, current

- and potential market participants would benefit from further clarification on which view is held by the MSP.
80. We have suggested how conduct tests can create incentives for market participants to devise strategic bidding strategies which systematically avoid triggering further scrutiny. Moreover, in the case of hydraulic energy limited generation, the detection of modest discrepancies from bidding which minimizes system wide costs seems technically quite challenging and likely not worth the expenditure of regulatory resources. (Major anomalies should continue to be detectable as before.) We suggest that an alternative to more refined efforts to detect and create disincentives for undesirable behaviour, is to ensure that market rules are creating positive incentives for desirable behaviour.
81. A phrase which has epitomized the evolution of regulation to incentive based approaches in the last quarter century has been “competition where possible, regulation where necessary”. A natural extension of this idea is “incentive creation where possible, regulation where necessary”. One of the key features of incentive regulation is a relatively light handed approach accompanied by incentives which are based on performance. The Ontario Energy Board has embraced incentive regulation. However, the overall tenor of the MSP Discussion Paper seems to lead in the direction of excessively detailed analysis of company operations (particularly in the hydraulic area) which would not seem to be consistent with a light-handed approach. In our view, greater attention to incentive creation which can obviate the need for detailed analysis is likely warranted. Indeed, given the asymmetry of information between the regulator and the regulated entities, it is also likely to be more fruitful.
82. The Market Surveillance Panel has noted in its Discussion Paper that the process that has been in place for several years has worked reasonably well. The MSP has not



found any case of abuse of market power, it has not launched any formal investigations, and where it did find deficiencies in market rules, the amendments that it recommended have been, for the most part, implemented. Moreover, based on the indicia that are available, among them comparisons with neighboring markets which have, in other reports, been found to be competitive, prices in the Ontario market are among the lowest. In our view, the increased regulatory burden flowing from analytical and data requirements under the proposals put forth in the Discussion Paper would not seem to be justified.

## Appendix A: Selective Review of the Literature

“Markets for Power in the United States: An Interim Assessment”, by Paul Joskow, *Energy Journal*, Vol. 27, No. 1, 2006, pages 1-36.

1. The author provides an overview of the state of electricity markets in the U.S. He notes that wholesale markets in the Northeast (in particular, the New York, New England and PJM markets) appear to be highly competitive based on a variety of structural, behavioural and performance indices.
2. The primary exceptions occur when transmission constraints create “load pockets” which permit the exercise of local market power. Even in these cases, it would appear that market monitoring and mitigation has been successful in limiting the exercise of market power. Indeed, the author argues that these measures may have constrained prices from rising to competitive levels when markets are tight.
3. The author describes a series of regulatory, system operation and market imperfections that in his view produce insufficient incentives for new investment in generation that would be consistent with prevailing engineering reliability criteria. These problems include:

“(a) price caps on energy supplied to the market and related market power mitigation mechanisms that do not allow prices to rise high enough during conditions when generating capacity is fully utilized to provide energy and operating reserves to meet reliability constraints. Under these conditions supply and demand should be balanced by responses on the demand side to high prices that reflect the value of lost load, producing significant competitive scarcity rents for generators; (b) price caps on capacity payments

in the market designs that incorporate capacity obligations and capacity prices; (c) actions by system operators that have the effect of keeping prices from rising fast enough and high enough to reflect the value of lost load during operating reserve emergencies when small changes in system operating procedures can lead to very large changes in prices and scarcity rents needed to cover fixed costs; (d) reliability actions taken by system operators that rely on Out of Market (OOM) calls on generators that pay some generators premium prices but depress the market prices paid to other suppliers; (e) the absence of adequate spot market demand response to allow prices to play a larger role in balancing supply and demand under tight supply conditions; (f) payments by system operators to keep inefficient generators in service due to transmission and related constraints rather than allowing them to be retired or be mothballed, (g) regulated generators operating within a competitive market that have poor incentives to make efficient retirement decisions, depressing market prices for energy and (h) engineering reliability rules that have not been harmonized with market mechanisms and may implicitly impose costs of meeting reliability standards that are significantly greater than what consumers would be willing to pay in a well functioning competitive market.”

4. He asserts that the problems of resource adequacy “arising from imperfections in spot energy markets are now widely recognized by policymakers.” Moreover, in his view, transmission congestion which reduces competition among generators can lead policymakers to put rules in place that create other distortions.

“Market Power Mitigation: Principles and Practice,” by Larry E. Ruff, Charles River Associates, November 14, 2002.

1. The author suggests five central objectives for a successful market power mitigation policy: (1) market power in spot markets should be put in perspective by focusing on overall market processes and outcomes; (2) spot scarcity pricing in independent transmission power (ITP) markets should be improved so that market power mitigation (MPM) can be both less distorting and more effective; (3) until spot price market are much improved, MPM should be narrowly focused and light-handed; (4) because aggressive MPM procedures will suppress spot prices, as long as such procedures are in place there must be effective capacity payment arrangements; and (5) electricity markets should quickly make the transition to full competition which requires efficient scarcity pricing in spot markets.
2. The paper develops the proposition that the mere fact that spot prices are higher than long-run marginal cost (LRMC) during peak periods or during periods of scarcity does not mean they are too high during these periods or overall. Prices are too high during scarcity conditions only if a competitive market, i.e., one in which the market price is at the intersection of short-run marginal cost (SRMC) and demand, would clear at a lower price. Prices are too high overall only if spot prices averaged over a period in which entry is possible are above LRMC. Because scarcity prices can depend on so many complex and even judgmental factors, there is no reliable way to decide when market-determined scarcity prices are too high or to compel suppliers to produce Goldilocks prices – not too high, not too low, but just right. Any administrative procedure for controlling prices or market behaviour will get it wrong much of the time. And because any such procedure will target the highest prices that are the hardest to explain objectively or to tolerate politically, such a procedure almost inevitably suppresses

scarcity prices below competitive levels. Forcing spot scarcity prices below competitive market-clearing levels will reduce the efficiency of the market and increase total costs to consumers in the long run.

3. In real workably competitive markets for commodities as disparate as tomatoes and real estate, suppliers make offers by posting the prices at which they are willing to sell. No seller in such a market decides what offer price to post by looking at his own SRMC curve. The seller's offer price is based on its estimate of the market clearing price, not on its average SRMC, much less on any simple marginal cost (MC). Because a supplier in such a market will ultimately sell at or near his own offer price, each supplier's offer price must frequently be above its average SRMC if it is to cover sufficient fixed costs to stay in business. Nobody expects a farmer to offer tomatoes at the cost of picking them or driving them to market, or a homeowner to offer his house at the cost of sprucing it up for sale. In most markets suppliers are not expected to offer to sell at MC, nor would they be accused of trying to exercise market power if they do not.
4. There is a widespread, but unexamined and often incorrect assumption that a competitive supplier in an ITP spot market would always offer all his output at some average SRMC or simple MC, from which it seems to follow that the way to control or mitigate suppliers' market power is simply to require all suppliers to offer all their supplies at or near their simple MCs. The author regards this assumption as incorrect and develops an extended critique of it.
5. The most relevant measure of spot market prices for judging when a market is workably competitive at some location is not the spot price during a few scarcity hours, but the average spot price over an extended period such as a year. If such average spot prices are above estimated LRMC when there is no shortage of supply, there is a good reason to

investigate whether supplier market power – as opposed, for example, to unusually high local LRMCs – is the problem. But if average spot prices are below LRMCs, particularly when there is no surplus capacity, the conclusion should be just the opposite: the interaction of the ITP's computer and supplier's bidding conduct is keeping prices too low. If spot prices averaged over (say) a year are higher than locally relevant LRMCs, or if some suppliers are consistently bidding at levels above any plausible estimate of true market clearing prices, it may be necessary to mitigate market power. Even under such circumstances, the best solution may be to stimulate additional supply or to negotiate contracts between the ITP and local suppliers, not to control prices or even bidding behaviour directly.

6. Concerns about supplier market power in the spot markets, particularly during scarcity conditions when unconstrained suppliers seem able to drive prices to arbitrarily high levels, have led to the development of automated mitigation procedures (AMPs). The basic, if unstated, assumption underlying these procedures is that it is relatively straightforward to establish how truly competitive suppliers would conduct themselves and to determine what the resulting competitive spot prices would be. (For example, they would all bid their MCs, which could be readily verified by the monitor or regulator.) Given this assumption, it is perhaps reasonable to say that any supplier conduct that departs significantly from the assumed competitive conduct and that causes a significant increase in the ITP-computed price is a successful exercise of market power and as such should be prohibited or mitigated. Unfortunately, this approach involves a fundamental logical inconsistency. Part of the solution to the problem of attaining reasonable scarcity pricing must be to allow real suppliers to bid the way that even perfectly competitive suppliers would bid in a centralized market clearing process.

7. Suppressing scarcity prices below competitive market clearing levels does consumers no good and even harms them in the long-run, expected-value sense because demand and supply must be met somehow and all the non-market ways of doing so are more costly than letting the market work.
  
8. In the author's suggested approach to market power, he points out that most consumers and most suppliers and middlemen do not care what the spot price is in any specific hour or how much it may change from hour to hour, because they will not or cannot respond to hourly spot prices and because they do most of their business under contracts and price-averaging provisions. What these players care about are average spot prices over periods ranging from a day to a year. But if suppliers are effectively exercising market power in spot markets, it will be detectable in time-averaged prices over longer periods. If such average spot prices are not above the LRMC levels needed to stimulate needed investment, there is no good reason to implement comprehensive, intrusive and potentially distorting procedures for identifying and mitigating market power in spot markets and many good reasons not to do so.

“A Review of the Monitoring of Market Power”, by Paul Twomey, Richard Green, Karsten Neuhoff and David Newbery, Center for Energy and Environmental Policy Research, March 2005.

1. This paper provides an extensive survey of the literature on the monitoring of wholesale electricity markets. It reviews the methods for detecting market power in electricity wholesale markets, provides an overview of market power monitoring in several countries, and briefly discusses some techniques for mitigating market power. The

authors note, without discussing in detail, some of the negative consequences of market power, including those arising from operation and investment inefficiency and transfers of wealth from consumers to producers.

2. The authors discuss the definition of the term ‘market power’ and consider a number of refinements of the standard definition, viz. the ability to profitably increase prices above competitive levels. They cite the European Union’s use of the term Significant Market Power in the context of communications markets, which is ‘the power to behave to an appreciable extent independently of competitors, customers, and ultimately consumers. They note that the definition of market power usually includes a requirement that any deviations from competitive pricing be profitable, and supra-competitive pricing is sometimes required to be sustained for some specified period of time before it is considered to constitute an exercise of market power. Ofgem in the U.K. proposed to introduce a definition of market power which specified the duration of supra-competitive pricing, but withdrew this proposal after two companies appealed its definition to the Competition Commission.
  
3. A number of implications of the cited definitions of market power are noted:
  - a. High prices do not prove that market power exists, since high prices can be consistent with a competitive market in conditions of supply scarcity;
  - b. Mitigation of market power in the spot market will not necessarily mitigate the exercise of market power in the forward market;
  - c. It is important to distinguish between local market power and system-wide market power, and;
  - d. To the extent that prevention is preferable to a cure, early detection of market power is seen to be an important objective by most market monitors.



4. The authors note the following strategies for exercising market power:
  - a. physical withholding of output that could be sold at prices above marginal cost;
  - b. financial or economic withholding, which involves bidding in prices higher than the competitive bid, and;
  - c. creation or exacerbation of transmission congestion to raise prices in a particular zone or node.
  
5. Electricity markets have a number of unique features that can facilitate detection of market power when it is assessed in relation to short run marginal costs. These features include the following: 1) in most wholesale markets generators bid their willingness to provide output for the entire range of market prices; this potentially allows for the construction of residual demand curves for individual market participants, which can be used to test for market power directly, and; 2) technological data, including generation heat rates and capacity are often available to market monitors, which potentially allows for more accurate estimation of short run marginal costs than is possible in many other types of markets. The wide availability of data on fuel costs facilitates the estimation of short run marginal costs.
  
6. Table 1 summarizes some methods of detecting market power. A distinction is made between detecting market power *ex ante* (looking for potential exercises of market power) and *ex post* (after market power has already been exercised), and also between longer and shorter time horizons.

**Table 1 - Categories of Market Power Detection Techniques**

	<b>Ex-Ante</b>	<b>Ex-Post</b>
<b>Long-Term Analysis</b>	<ul style="list-style-type: none"> <li>- Structural indices (market share, HHI, residual supply index)</li> <li>- Simulation models</li> </ul>	<ul style="list-style-type: none"> <li>- Competitive benchmark analysis based on historical costs and costs in other jurisdictions</li> <li>- Comparison of market bids with profit maximizing bids</li> </ul>
<b>Short-Term Analysis</b>	<ul style="list-style-type: none"> <li>- Bid screens comparing bids to reference prices</li> <li>- structural indices such as pivotal supplier indicators and congestion indicators</li> </ul>	<ul style="list-style-type: none"> <li>- Forced outage analysis and audits</li> <li>- Residual demand analysis</li> </ul>

7. Market mitigation methods are grouped into three categories: structural solutions (e.g. divestiture), regulatory solutions (e.g. market-price caps), and market rules solutions (e.g. unit-specific bidding). The last two are seen by most economists to be suitable primarily for facilitating the transition to a fully competitive market, rather than as a permanent feature of the market. The authors note that the costs of eliminating market power completely can be very high, and will generally exceed the costs of further mitigation. Although there is little empirical work on this issue, there appears to be a consensus among economists that ‘workable’ competition, rather than perfect competition (where market power is completely absent) is the appropriate goal for mitigation. They note, however, that the extent of market power that is tolerable under a ‘workable competition’ standard is often vague.

8. The authors then discuss a number of ‘indices’ that can be used as simple indicators, or predictors, of market power. They discuss structural indices, behavioural indices, and simulation methods.

Structural Indices:

9. Market Share: In most economic models, market power is often positively related to market share. For example, in a model of Cournot competition, a firm’s price-cost margin is proportional to its market share. There are several issues that need to be resolved before market shares become useful indices, including the appropriate definition of the product and geographic markets. In addition to a methodology for defining the markets, an appropriate benchmark, or ‘safe harbour’, must be determined. For example, FERC in the U.S. identified 20% as the appropriate benchmark: if the firm’s market share is below 20%, it is not considered to have market power.
10. Although market share and the Herfindahl-Hirschman Index (HHI) are commonly used in antitrust analysis, their use as indicators of market power in electricity markets has been criticized on the basis that even a firm with a low market share (say, 10%) may still be able to exercise market power, because, particularly in periods where system demand is close to capacity, firms can become ‘pivotal’ even with very low market share. A study by Sheffrin (2001) concluded that under certain market definitions, no supplier in California had a market share exceeding 20% during the California crisis, yet the market was conceivably not workably competitive. A study by William and Rosen (1999) found that an HHI based on actual power delivered had no ability to predict actual market power.
11. The Pivotal Supplier Index (PSI) is constructed in an attempt to determine whether a given generator is pivotal for determining demand. The PSI for a supplier at a given

point in time is set equal to one if the supplier is pivotal and to zero if the supplier is not pivotal. The PSI's for every hour over a given time period, such as a year, are summed to arrive at a measure of the percentage of the time period that the firm is pivotal. FERC adopted a PSI, named the Supply Margin Assessment ("SMA") in 2001 to replace its 20% market share safe harbour. The SMA has been criticized because: it is highly restrictive and is based on a single hour being pivotal; it does not account for the net buying or selling positions in the market, it only applies to peak hours and may therefore miss other opportunities to exercise market power; it overlooks the potential for coordinated interaction, and; it ignores operating considerations relating to maintenance of an operating reserve.

12. The residual supply index (RSI) is similar to the PSI, but instead of being measure on a binary scale (i.e. the generator is either pivotal or not), the RSI is measured on a continuous scale. This accounts for the possibility that a firm can exercise market power when it is nearly, although not actually, pivotal. RSI has been successfully used to predict actual market power (measured as the price-cost mark-up) in California.
  
13. Residual demand analysis provides another promising technique to assessing market power. Under this approach, the residual demand curve for a firm is calculated as the market demand curve less the offer curves of all other bidders. It can be estimated using archived data on firms' offers. If a firm's residual demand curve is elastic, then it has little ability to profitably raise price above the competitive level, since by increasing price it experiences reductions in demand for its output. If, on the other hand, the firm is pivotal it will have an inelastic residual demand curve, implying that it has market power.

14. Behavioural indices examine the actual conduct of companies, while structural indices focus on the potential for the exercise of market power. These indices are typically based on actual bids, and the challenge is to construct indices that distinguish between high bid levels that are due to market power from those that have some other cause.
15. The study of bid-cost margins is premised on the observation that bids in excess of marginal costs can be indicative of market power, whether or not the bid determines the market price. Researches typically use either the Lerner index ( $(\text{price} - \text{marginal cost})/\text{price}$ ) or the price-cost margin index ( $(\text{price} - \text{marginal cost})/\text{marginal cost}$ ). In a perfectly competitive market both margins should be zero. An important difficulty with studying bid-cost margins is determining the appropriate measure of marginal cost. Variable fuel costs, calculated from fuel prices and thermal efficiencies (heat rates) are often used, but the authors note that this entails a number of problems, including that there are other variable costs that are difficult to quantify and some units (e.g. hydro generators) have substantial opportunity costs that are not reflected in fuel cost data.
16. The authors also note that there is a real question of whether the appropriate measure of costs is long run marginal cost or short run marginal cost. Analysis of a firm's long run revenues, which is calculated as the firm's revenues from energy, capacity, and ancillary services market less its generation costs, including a competitive return on investment, can provide evidence of whether the firm is earning abnormal profits and whether it is earning enough revenue to cover fixed costs.

“Managing Unilateral Power and Electricity” by Frank A Wolak, World Bank Policy Research Working Paper 3691, September 2005 <sup>14</sup>

1. The author emphasizes that it is impossible for the regulator to prevent firms from exercising unilateral market power. Regulatory mechanisms that attempt to prevent all exercise of unilateral market power can introduce market inefficiencies that cause more economic harm than the market power they are attempting to prevent.
2. The regulatory process should be self-correcting in the sense that there are pre-specified regulatory responses known in advance to market participants to specific market outcomes and participant behaviour that significantly degrades system reliability or market efficiency.
3. The experience from California and from other markets around the world argues in favour of a prospective regulatory process that anticipates possible harmful market outcomes and builds in incentives for market participants to solve these problems without the need to formulate new regulatory policy. Rather than attempting to formulate such policy under the intense scrutiny that accompanies harmful market outcomes, a more prudent approach is to build in mechanisms that anticipate and address as many of the potential harms as possible.
4. The experience of a number of wholesale electricity markets suggests that imprecise market rules that appear to prohibit a wide range of behaviour may lead to a less reliable transmission network than seemingly less restrictive but more clearly defined market rules that are substantively more straightforward to monitor and enforce.

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<sup>14</sup> See also Frank Wolak, “Lessons from International Experience with Electricity Market Monitoring,” Department of Economics, Stanford University, June 21, 2004.

5. Enforcing market rules that address problems of market power without causing more harm than is cured is extremely difficult. The prime example of this phenomenon in electricity market oversight is distinguishing between the unilateral exercise of market power and the poorly defined, but often invoked, concept of market manipulation.
6. As noted above, it is impossible to prevent firms from exercising all available unilateral market power. The ability to prevent all such behaviour would imply the existence of a perfect regulatory process. The market or system operator would need to know each supplier's minimum cost of producing power and could then dispatch suppliers on this basis. However, if such a regulatory process existed there would be little need to introduce a competitive market because, by assumption, a lower average cost of supplying power to consumers could be achieved by paying suppliers only their minimum cost of production, rather than the market-clearing price set through a process where all suppliers bid to maximize their expected profits for the energy they produce. Consequently, any mechanism used to mitigate market power is necessarily imperfect in the sense of being unable to protect consumers from the exercise of all market power.
7. The market designer is typically faced with a choice between an imperfectly competitive market and an imperfect regulatory mechanism. This logic implies a regulatory process that provides incentives for efficient market outcomes, instead of focusing on preventing firms from exercising all unilateral market power. The regulatory process should provide the strongest possible incentives for least-cost provision of electricity to final consumers consistent with the long-term financial viability of the industry.
8. Administering a regulatory process is costly and regulatory intervention even more so. Therefore, it is important to account for these costs in the design and operation of the regulatory process. Specifically, the regulatory process should first focus on actions that

have very high market efficiency benefits relative to the implementation costs. The regulator should also periodically review the costs and benefits of all aspects of the regulatory process.

9. The author goes on to describe the three major responsibilities of the industry-specific regulator and how these should be carried out. They are: (1) disseminating information to existing and prospective market participants, (2) ensuring compliance with all the market rules, and (3) protecting against behaviour that degrades market efficiency and system reliability.
  
10. In terms of identifying behaviour detrimental to system reliability and market efficiency, he argues that it is an impossible task to demonstrate that a market participant has manipulated the market. Viewed from one perspective, all suppliers that attempt to impact the price they are paid through their own unilateral actions are engaging in market manipulation. Consequently, a blanket prohibition of market manipulation written into the market rules seems to prohibit suppliers from maximizing profits given the actions of their competitors. The prohibition of behaviour that is detrimental to system reliability and market efficiency focuses on identifying and eliminating detrimental behaviour by market participants, rather than on punishing this behaviour.
  
11. A necessary condition for identifying inappropriate market behaviour is the ability to demand and receive information from market participants. This requirement should be subject to the constraints that the information request is necessary to undertake the current investigation and does not impose costs on the market participant that are out of line with the alleged harm that the market participant is imposing. The regulator must first determine if this behaviour is persistent and if it has the potential to impose significant harm either because it is very persistent or extremely harmful when it does



occur. The next stage of the process involves alerting all market participants to the existence of this behaviour and publicly disclosing the identity of the market participant engaging in it.

## APPENDIX B

### MICHAEL J. TREBILCOCK

*PROFESSOR OF LAW AND ECONOMICS, UNIVERSITY OF TORONTO*

LL.B. (University of Canterbury, New Zealand)

LL.M. (University of Adelaide, South Australia)

#### EMPLOYMENT HISTORY:

Appointed full-time Tutor, Law School, University of Adelaide, January, 1963

Appointed Lecturer in Law, Adelaide, January, 1964

Appointed Senior Lecturer, Adelaide, January, 1967

Barrister and Solicitor of the Supreme Court of New Zealand, 1964

Visiting Associate Professor of Law, McGill Law School, 1969 - 1970

Associate Professor of Law, McGill Law School, 1970 - 1972

Professor of Law, University of Toronto Law School, 1972 - present

Barrister and Solicitor of the High Court of Ontario, 1975

National Vice-President, Consumers Association of Canada, 1974 - 1975

Chairman, Regulated Industries Program, Consumers Association of Canada, 1973 - 1975

Member, Academic Advisory Panel, Department of Consumer and Corporate Affairs, 1973 - 1975

Chairman, Consumer Research Council, 1975 - 1976

Research Director, Professional Organizations Committee, Government of Ontario, 1976 - 1980

Participant, Summer Institute, Economics for Law Professors University of Rochester, 1974

Fellow in Law and Economics, University of Chicago Law School, 1976

Member of the Presidential Advisory Committee on Institutional Strategy (PACIS), University of Toronto 1982 - 1983

**EMPLOYMENT HISTORY (cont'd)**

Acting Research Director; Institute of National Affairs, Papua New Guinea, 1982

Lay Member - Canadian Competition Tribunal, 1987 - 1989

University Law School Committees (at various times): Admissions Committee, Curriculum Committee, Graduate Committee, Hiring Committee, Course Assignments Committee

Director, Laidlaw Foundation, 1985-1991

Member, Research Board, University of Toronto, 1986 – 1988

Appointed University Professor, University of Toronto, 1990

Member of the Research Council of the Canadian Institute of Advanced Research, 1982 – 1986

Director, Law and Economics Programme, University of Toronto Law School, 1976 - present

Chairman, International Business and Trade Law Programme, University of Toronto Law School, 1988 - 1995

Director, Centre for the Study of State and Market, 1995 – 2000

Visiting Professor, University of Virginia Law School, Fall 1996

Global Law Professor, NYU Law School, Fall 1997 and 1999

Research Director, Ontario Legal Aid Reform Task Force, 1997 and 1999

Research Director, Ontario Electricity Market Design Committee, 1998

Research Director, Panel on the Future Role of Government in Ontario, 2002-2004

Visiting Professor, Yale Law School, 1985 and 2005

Visiting Professor, University of Pennsylvania Law School, February 2007

## **HONOURS AND AWARDS**

Elected Fellow of Royal Society of Canada, 1987

Recipient, University of Toronto Teaching Award, 1986

Winner of the Walter Owen Prize for Best English Legal Text in Canada, 1986 - 1988 for  
The Common Law of Restraint of Trade

Recipient of the 1990 Joint Award of the Canadian Law Teachers Association and Law  
Reform Commission of Canada for outstanding contributions to legal research and law  
reform

Elected Honorary Foreign Fellow, American Academy of Arts and Sciences, 1999

Recipient of Canada Council Molson Award for contributions to the Social Sciences and  
Humanities, 1999

Recipient of an Honorary Doctorate in Laws from McGill University, 1999

Elected President American Law and Economics Association, 2002

Winner (with Ralph Winter, Paul Collins and Edward Iacobucci) of the Doug Purvis  
Memorial Prize for contributions to Canadian Economic Policy for their book, The Law  
and Economics of Canadian Competition Policy, 2003

Recipient of an Honorary Doctorate in Laws from the Law Society of Upper Canada,  
2003

Recipient of the Ontario Attorney General's Mundell Medal for contributions to Law and  
Letters, 2007

## **GRADUATE SUPERVISION**

80 LL.M.s since 1969

10 Ph.Ds

## **GRADUATE COURSES TAUGHT**

Alternative Approaches to Legal Scholarship, 1985

The Public Policy-Making Process (Department of Economics), 1982 - 1985

Social Regulation (Osgoode Hall Part-time LL.M.), 1987

International Trade Regulation (Osgoode Hall Part-Time LL.M.), 1990

## **LL.B. COURSES TAUGHT AT VARIOUS TIMES**

Commercial Law; Corporate Law: Contract Law; Competition Law; Government Regulation; Social Security Law; Economic Analysis of Law; International Trade Regulation; The Limits of Freedom of Contract; Debtor - Creditor Law; Consumer Protection Law; Public Goals Private Means; Law, Institutions & Development.

## **RESEARCH FUNDING**

### **PROGRAMME GRANTS**

Connaught Seed Grant to Law and Economics Programme, 1976 – 1980 (\$140,000)

Donner Foundation Grant to Law and Economics Programme, (\$150,000)

Connaught Grant to Legal Theory and Public Policy Programme, 1985 (\$800,000)

Olin Grant to Law and Economics Programme, 1989 ( \$330,000)

### **PROJECT GRANTS (WITH OTHERS)**

Crown Corporations in Canada (Ontario Economics Council ), 1978 – \$30,000

Federalism and the Canadian Economic Union (Ontario Economic Council and Canada - U.S. Law Institute), 1980 – \$80,000

The Choice of Governing Instrument (Economic Council of Canada), 1980 – \$80,000

The Political Economy of Business Bailouts (Ontario Economic Council), 1984 – \$80,000

The Political Economy of Economic Adjustment (Macdonald Royal Commission, 1985 – \$15,000

**PROJECT GRANTS (WITH OTHERS) (cont'd)**

Adjusting to Trade (Economic Council of Canada), 1988 – \$ 15,000

Medical Malpractice (Federal-Provincial Health Care Task Force), 1988 – \$55,000

American Law Institute, Tort Reform Project), 1990 – \$80,000

**PUBLICATIONS:**

**BOOKS:**

A Casebook on Company Law, (Sweet and Maxwell, U.K. 1977) with H.R. Hahlo

The Professions and Public Policy (University of Toronto Press, 1978) with Slayton (eds.)

Handbook on Consumer Rights in Canada (C.B.C., 1978; revised edition forthcoming)

Professional Regulation (Ontario Govt. Printer, 1979) with Tuohy and Wolfson

Debtor and Creditor Casebook, (University of Toronto Press, 1982) with Reiter, Laskin, Springman and Gertner

Lawyers and the Consumer Interest, Evans and Trebilcock (eds.) (Butterworths, 1982)

Federalism and the Canadian Economic Union edited with Prichard, Whalley and Courchene, (University of Toronto Press, 1983)

The Political Economy of Business Bailouts with Chandler, Quinn, Halpern and Gunderson, (Ontario Economic Council, 1986)

The Political Economy of Economic Adjustment: The Case of Declining Sectors, (Macdonald Royal Commission, Research Monograph, 1986)

The Common Law of Restraint of Trade: A Legal and Economic Analysis (Carswell, Toronto, 1986) (winner of Walter Owen Prize)

Canadian Competition Policy: A Legal and Economic Analysis (with Dunlop and McQueen) (Canada Law Book Co., 1987)

Regulating Traffic Safety (with Friedland and Roach) (University of Toronto Press, 1990)

Trade and Transitions (with Chandler and Howse) (Routledge, 1990)

**BOOKS (cont'd)**

The Law and Economics of Competition Policy (Fraser Institute, 1990) (with Mathewson and Walker, eds.)

Fair Exchange: Reforming Trade Remedy Laws (C.D. Howe, 1990) (with York, eds.)

The Limits of Freedom of Contract (Harvard University Press, 1993)

Unfinished Business: Reforming Trade Remedy Laws in North America (With Boddez) (C.D. Howe, 1993)

Exploring the Domain of Accident Law: Taking the Facts Seriously (with Dewees and Duff) (Oxford University Press, 1996)

The Regulation of International Trade (with Howse) (Routledge, 1995)

Getting There: The Agreement on Internal Trade (edited with Schwannen) (C.D. Howe Institute, 1995)

Michael Trebilcock (with Ninette Kelley), The Making of the Mosaic: A History of Canadian Immigration Policy (University of Toronto Press, 1999).

Michael Trebilcock, Edward Iacobucci, and Huma Haider, Economic Shocks: Defining a Role for Government, published by the C.D. Howe Institute, 2001.

Michael Trebilcock, Ralph Winter, Paul Collins, and Edward Iacobucci, The Law and Economics of Canadian Competition Policy (University of Toronto Press, 2002).

Michael Trebilcock and John Kirton (eds.), Hard Choices, Soft Law: Voluntary Standards in Global Trade, Environment and Social Governance (Ashgate, 2004).

Michael Trebilcock (with Ron Daniels), Rethinking the Welfare State: The Prospects for Government by Voucher (London: Routledge, 2005).

Michael Trebilcock (with Robert Howse), The Regulation of International Trade (Routledge, 2005), 3rd edition.

Albert Breton and Michael Trebilcock (eds.), Bijuralism: An Economic Approach (Ashgate, 2006)

**CHAPTERS IN BOOKS**

“When is a Consumer Protection Bill not a Consumer Protection Bill?”, (1971 Wainwright Lecture Collection)

“The Consumer in the Post-Industrial Market-Place”, in Lindgreen and Mason (eds.), *The Corporation and Australian Society*, (Law Book Co. of Australia, 1974)

“The Consumer Interest and Regulatory Reform”, in Doern (ed.), *The Regulatory Process in Canada* (Macmillan, 1978)

“Problems of Economic Integration in a Decentralized Federation”, (with Shiroky), in *The Canadian Confederation at the Cross-roads* (Fraser Institute, 1978)

“Economic Analysis of Commercial Law”, (with Prichard) (Annual Commercial Law Workshop Volume, 1978)

“Markets for Regulation”, (with Waverman, Prichard), in *Government Regulation* (Ontario Economic Council, 1978)

“Interprovincial Restrictions on the Mobility of Resources”, (with others) (Ontario Economic Council, 1977)

“The Consumer Interest and the Regulatory Process”, (with Prichard and Waverman), in Duggan and Dorvall (eds.), *Consumer Protection Law and Theory* (Law Book Co., 1980)

“Crown Corporations: The Calculus of Instrument Choice”, (with Prichard) in Prichard (ed.), *Public Enterprise in Canada*, (Butterworth, 1983)

“An Approach to Framing Regulatory Policies for the Professions”, (with Tuohy and Wolfson) in Rottenberg (ed.), *Occupation Licensure*, (American Enterprise Institute, 1980)

“Regulating the Quality of Psychotherapeutic Services”, (with Shaul) in Dewees (ed.), *Quality Regulation*, (1983); also in *Journal of Law and Human Behaviour*, (1983).

“Policy Options in Quality Regulation”, (with Dewees), in Dewees (ed.), *Quality Regulation*, (1983)

“Comparative Advertising”, in Evans and Trebilcock (eds.), *Lawyers and the Consumer Interest*, (Butterworths, 1982)

“Licensure in Law”, (with Reiter) in Evans and Trebilcock (eds.), *Lawyers and the Consumer Interest*, (Butterworths, 1982)



**CHAPTERS IN BOOKS (cont'd)**

“Crown Corporations in Canada”, (with Prichard) in Chandler and Atkinson (eds.), *Public Policy Making in Canada*, (University of Toronto Press, 1982)

“Customary Land Law Reform in Papua New Guinea”, *Adelaide Law School Centenary Essays*, (1983)

“Federalism and the Canadian Economic Union”, in Bakvis and Chandler (eds.) *Federalism and the Role of the State* (University of Toronto Press, 1987)

“Can We Become Better Losers? The Political Economy of Economic Adjustment”, in Maslove and Winer (eds.), *Knocking on the Back Door* (I.R.P.P. 1987)

“Economic Analysis of Law” in Devlin (ed.), *Studies in Canadian Legal Theory* (Carswell, 1990)

“The Evolution of Competition Policy: A Comparative Perspective” in Mathewson, Trebilcock and Walker (eds.), *The Law and Economics of Competition Policy* (Fraser Institute, 1980)

“Throwing Deep: Trade Remedy Laws in a First-Best World” in Trebilcock & York (eds.), *Fair Exchange: Reforming Trade Remedy Laws* (C.D. Howe, 1990)

“The Future of Ontario Hydro: A Review of Structural and Regulatory Options” (with Daniels) in Daniels (ed), *Ontario Hydro at the Millenium: Has Monopoly's Moment Passed?* (McGill-Queen's Press, 1996)

“Choice of Policy Instrument in the Provision of Public Infrastructure” (with Daniels) in Mintz (ed.) *Infrastructure and Competitiveness* (John Deutsch Institute, 1994)

“What Makes Poor Countries Poor? The Role of Institutional Capital in Economic Development” in Buscaglia and Cooter (eds.), *The Law and Economics of Development* (JAI Press, 1997)

“Competition Policy and Intellectual Property Rights” (with Gallini) in Anderson & Gallini: eds. *Competition Policy and Intellectual Property Rights* (Industry Canada, 1998).

“The Value and Limits of Law and Economics”, in Hadfield and Richardson (eds) *The Second Wave of Law and Economics* (Federation Press, 1999)

“Immigration Policy” in *Palgrave Dictionary of Economics and the Law* (1998)

**CHAPTERS IN BOOKS (cont'd)**

“Mostly Smoke and Mirrors: NGOs and the WTO”, paper presented to an International Conference at New York University in March 2000, commemorating the 200th anniversary of the Library of Congress. This paper was published in a volume of conference papers.

“Regulatory Diversity and Trade and Investment Liberalization”; paper presented at OECD Conference, Paris, December 2000, published in a volume by the OECD, 2001.

“International Trade Policy and Domestic Food Safety Regulation,” (with Julie Soloway), in David Kennedy and James Southwick (eds.), *The Political Economy of International Trade* (Cambridge University Press, 2002).

“International Trade & International Labour Standards,” in Stefan Grillner (ed.), *International Economic Governance and Non-Economic Concerns* (Springer-Wien, 2003).

“Rethinking Consumer Protection Policy,” in Charles Rickett and Thomas Telfer (eds.), *International Perspectives on Consumer Access to Justice* (Cambridge 2003).

“Trade Policy and Labour Standards,” in J. Kirton and M. Trebilcock (eds.), *Hard Choices, Soft Law* (Ashgate, 2004).

“The National Treatment Principle in International Trade Law,” (with Shiva Giri), in Choi and Hartigan (eds.), *Handbook of International Trade*, Volume II (Oxford: Blackwell, 2005).

“The Choice of Governing Instrument: A Retrospective,” in Eliades, Hill and Howlett (eds.), *Designing Government* (McGill-Queens Press, 2005).

“Towards a New Compact in University Education in Ontario,” (with Ron Daniels) in F. Iacobucci and C. Tuohy (eds.), *Taking Public Universities Seriously* (University of Toronto Press, 2005).

“Journeys Across the Divides,” in Parisi and Rowley (eds.), *The Origins of Law and Economics: Essays by the Founding Fathers* (Edward Elgar, 2005).

“Electricity Restructuring in Canada,” (with Roy Hrab) in Sioshansi and Pfanffeyer (eds.), *Electricity Market Reform: An International Perspective* (Elsevier, 2006).

“Competition Class Actions: An Evaluation of Deterrence and Corrective Justice Rationales,” (with Margaret Sanderson), in Stephen Pitel (ed.), *Litigating Conspiracy: An Analysis of Competition Class Actions* (Irwin, 2006)

**CHAPTERS IN BOOKS (cont'd)**

“Rationales and Instruments for Government Intervention in Natural Disasters,” (with Ron Daniels), in Daniels, Kettl and Kunreuther (eds.), *On Risk and Disaster* (U. of Pennsylvania Press, 2006)

“The Political Economy of Deregulation in Canada,” (with E. Iacobucci and R. Winter), in Martin Levin (ed.), *The Policies of Deregulation* (forthcoming, Brookings Institute).

“The Demand for Bijurally Trained Canadian Lawyers,” (with Kevin Davis), in Breton and Trebilcock (eds.), *Bijuralism: An Economic Approach* (Ashgate, 2006)

“The Lessons and Limits of Law and Economics,” in Pierre Noreau (ed.), *In the Eye of the Beholder* (Montreal: Université de Montréal, Centre de recherche en droit public, 2007)

“International Trade: Barriers to Trade,” (with Michael Fishbein), in Guzman and Sykes (eds.), *Research Handbook in International Economic Law* (Edward Elgar, 2007)

**PUBLISHED ARTICLES**

“Finders Keep - How True Today?” [1962] *N.Z.L.J.* 276

“Scope of the Defence of Provocation in New Zealand Law” [1963] *N.Z.L.J.* 619

“Section 260: A Critical Examination” (Income Tax) (1964) 38 *Australian Law Journal* 237 (discussed and applied by the New Zealand Supreme Court in *Lewis v. Commissioner of Inland Revenue*, [1965] *N.Z.L.R.* 634)

“Taxation of Assigned Income” (1963) 4 *The Australian Lawyer* 121 and 145

“Company Contracts” (1966) Vol. 2, No. 3 *Adelaide Law Review* 310

“Rights on a Bill of Exchange” (1966) Vol. 2, No. 3 *University of Tasmania Law Review* 270

“Effects of Alterations to Articles of Association” (1967) Vol. 31, No. 2 *The Conveyancer* (U.K.) 95

“Re-opening Hire-purchase Transactions” (1968) 41 *Australian Law Journal* 424

“The Liability of Company Directors for Negligence” (1969) U.K. *Modern L.R.*, September issue

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“Company Law Problems in Family Tax Companies” 1969 *Australian Law Journal*, January, February, March issues

“When does a Settlement ‘Take Effect’?” (Succession Duty) (1969) 42 *Australian Law Journal* 308

“Reform of the Law Relating to Consumer Credit” - (1970) Vol. 7, No. 4, *Melbourne University Law Review* 315

“Consumer Protection in the Affluent Society”, (1970) 16 *McGill L.J.* 263

“Protecting Consumers Against the Purchase of Defective Merchandise”, (1971) 4 *Adelaide L.R.* 12

“Private Law Remedies for Misleading Advertising” (1972) 22 *University of Toronto L.J.*

“Manufacturers’ Guarantees”, (1972) 18 *McGill L.J.* 2

“Market Considerations in the Formulation of Consumer Protection Policy” (1973) 23 *University of Toronto Law Journal* 396 (with Cayne)

“Winners and Losers in the Modern Regulatory System: Must the Consumer Always Lose?”, (1975) 13 *Osgoode Hall L.J.* 417

“The Pathology of Credit Breakdown”, (1976) 22 *McGill L.J.* 417

“Regulators and the Consumer Interest”, (1977) 2 *Canadian Business L.J.* 101

“Class Actions and Private Law Enforcement”, (with Prichard) (1978) 27 *U.N.B.L.J.* 5

“The Doctrine of Inequality of Bargaining Power”, (1976) 26 *University of Toronto L.J.* 359

“An Economic Approach to the Doctrine of Unconscionability” in Reiter and Swan (eds.) *Essays in the Law of Contract* (Butterworths, 1979)

“A Consumer Perspective on the Anti-Dumping Act” (with Quinn) 1979 *Canada-U.S. Law Journal*

“Judicial Control of Standard Form Contracts: An Economic Analysis” (with Dewees), (in Veljanovski and Burrows, eds.)

“A Tax Credit for Public Interest Groups” (with Engelhart), *Canadian Taxation* 1982

**PUBLISHED ARTICLES (cont'd)**

“An Economic Analysis of Cost and Fee Rules and Class Actions” (with Dewees and Prichard) (1981) 10 *Journal of Legal Studies*, University of Chicago, 155)

“An Economic Analysis of Limited Liability in Corporation Law” (with Halpern and Turnbull), (1980) 30 *University Toronto L.J.* 117

“The Deregulation Debate”, (1979) 10 *Canadian Marketer* 9

“Compensation, Transition Costs and Regulatory Change” (with Quinn) 1982 *University of Toronto L.J.*

“The Choice of Governing Instrument” (with Hartle) *The International Review of Law and Economics*, U.K., 1982

“Lawyers Advertising” (with Hudec) *University of Western Ontario L.R.*, 1982)

“The Administration of the Federal Hazardous Products Act” (with Shaul) *Canadian Business Law Journal*, 1982

“The Prospects of Law and Economics: A Canadian-Perspective” (1983) 33 *J. Leg. Ed.* 288

“Regulatory Reform and the Political Process”, (with Hartle) (1982) 20 *Osgoode Hall L.J.* 643

“Products Liability and the Allergic Consumer - A study in the Problems of Framing an Efficient Liability Regime” (with Rogerson) (1986), *University of Toronto Law Journal*

“Communal Property Rights: The Papua New Guinean Experience”, (1984) 34 *University of Toronto L.J.* 377

“The Law and Economics of Contract Modifications” (with Aivazian and Penny), (1984) 22 *Osgoode Hall L.J.* 173

“Restrictive Covenants in the Sale of a Business”, (1984) *International Review of Law and Economics*

“Economic Mobility and Constitutional Reform”, (1987) *University of Toronto L.J.* 268 (with Lee)

“The Social Insurance-Deterrence Dilemma of Modern North American Tort Law”, (1987) 24 *San Diego L.R.* 929

**PUBLISHED ARTICLES (cont'd)**

“The Role of Insurance Considerations in the Choice of Efficient Civil Liability Rules”, (1988) *Yale J. L. Ec. and Org.*

“Incentive Issues in the Design of No-Fault Compensation Schemes”, (1988) *University of Toronto Law Journal*

“The Case for Free Trade”, (1988) 14 *Can. Bus. L. J.* 387

“The Future of Tort Law: Mapping the Contours of the Debate”, (1989) 15 *Can. Bus. L.J.*

“Punitive Damages: Divergence in Search of a Rationale”, (with Chapman) (1989) 40 *Alabama L. Rev.* 741

“An Empirical Analysis of the Application of Canadian Antidumping Laws: A Search for Normative Rationales”, (with Hutton), (1990) 24 *J. World Trade* 123

“Trade Restrictive Policies and Democratic Politics: A Proposal for Reform” (with Chandler and Howse) (1990), 1 *Public Law* 234

“Smaller or Smarter Government?” (with Howse and Prichard) (1990) 40 *Univ. Toronto L.J.* 498

“Making Hard Social Choices: Lessons From the Auto Accident Compensation Debate”, (with Chapman) (1992) 44 *Rutgers L. Rev.* 78

“The Efficacy of the Tort System and its Alternatives: A Review of the Empirical Evidence”, (with Dewees) (1992) 30 *Osgoode Hall L.J.* 57

“The Role of Private Ordering in Family Law: A Law and Economics Perspective”, (with Keshvani) (1991) 41 *U. of Toronto L.J.* 5

“Rethinking Anti-Competitive Conspiracy Law”, (with Warner), *McGill L.J.* (forthcoming)

“Protecting the Employment Bargain” (with Howse) *U. of Toronto L.J.* (forthcoming).

“Taking Stock: Consumerism in the 1990s”, (1991) 19 *Canadian Business L.J.* 412

“The Medical Malpractice Crisis: A Comparative Empirical Perspective”, (with Dewees and Coyte) (1991) 65 *Law and Contemporary Problems* 217

“Reforming Trade Remedy Law in North America” (with Boddez) (1994) *Minnesota J. of Global Trade*

**PUBLISHED ARTICLES (cont'd)**

“Testing the Limits of Freedom of Contract: Commercialization of Reproductive Technologies and Materials” (with Martin, Lawson and Lewis) (1994) 32 *Osgoode Hall L.J.* 613

“The Canadian Internal Trade Agreement” (with Behboodi) in Schwanen and Trebilcock, *Getting There* (C.D. Howe, 1995)

“Voice and Exit in New Zealand Health Care Reforms” (*University of Auckland Research Journal*)

“Can Governments Be Reinvented?” in Boston (ed.) *The State in an Age of Contracting Out* (1995)

“The Prospects for Reinventing Government” (C.D. Howe Institute, Toronto, 1994)

“Do Institutions Matter: A Comparative Pathology of the HIV-Infected Blood Tragedy” (with Howse & Daniels), (1996) 82 *Virginia L. Rev.* 1407

“The Fair Trade - Free Trade Debate: Trade, Labour and the Environment”, (with Howse), (1996) *International Review of Law and Economics*

“The Economics of Nuclear Accident Law”, (with Winter), (1997) 17 *International Review of Law and Economics* 215

“Private Provision of Public Infrastructure: An Organizational Analysis of the Next Privatization Frontier”, (with Daniels) (1996) 46 *U. of Toronto L. J.* 375

“Public Accountability in an Age of Contracting Out”, (with Atwood), (1996) 27 *Canadian Business L. J.* 1

“Competition Policy and Trade Policy: Mediating the Interface”, (1996), 30 *J. of World Competition* 71

“An Introduction to Law and Economics”, (1997) 23 *Monash University Law Review* 124

“Rethinking the Role of the Competition Tribunal” (with Campbell and Janisch) (1997) 76 *Canadian Bar Review* 297

“Private Enforcement of Competition Laws” (with Roach) (1996) 34 *Osgoode Hall Law Journal* 462

“The Limits of the Full Court Press: Of Blood and Mergers”, (with Austin) (1998) 48 *University of Toronto Law Journal* 1

**PUBLISHED ARTICLES (cont'd)**

“Trade Liberalization and Regulatory Diversity: Reconciling Competitive Markets with Competitive Politics”, (with Howse) (1998) 6 *European Journal of Law and Economics* 5

“Rethinking Consumer Protection Policy” (with Hadfield and Howse) (1998) *Journal of Consumer Policy*

“Risk Regulation: Technocratic and Democratic Tools for Regulatory Reform”, (with Fraiberg), (1998) 43 *McGill Law Journal* 835

“Market Power Issues in Electricity Industry Restructurings”, (with Gal) (1999) 22 *Journal of World Competition*, 119

“Lurching Around Chicago: The Positive Challenge of Explaining the Recent Regulatory Reform Agenda”, published in Bird, Trebilcock and Wilson (eds.), *Rationality and the Policy Process* (Canadian Tax Foundation), 1999

“Government by Voucher” (with Ron Daniels) (February 2000) 80 *Boston University Law Review* 205

“Electricity Restructuring: The Ontario Experience”, (with Ron Daniels) (April 2000) 33, *Canadian Business Law Journal* 161

“The State of Efficiencies in Canadian Merger Policy” (with Ralph Winter) (Winter 2000) 19 *Canadian Competition Record* 106

“The Supreme Court and Strengthening the Conditions for Effective Competition in the Canadian Economy” (2001) 80 *Canadian Bar Review* 542.

Michael Trebilcock and Steven Elliott, “The Scope and Limits of Legal Paternalism: Altruism and Coercion in Family Financial Arrangements”, in Peter Benson Ed. *The Theory of Contract Law*, Cambridge University Press, 2001.

Michael Trebilcock, “Regulating Legal Competence” (2001) 34 *Canadian Business Law Journal* 444.

Michael Trebilcock and Kevin Davis, “Law Reforms and Development: An Overview of the Evidence” (2000) *Third World Quarterly*

“Ethnically Homogeneous Commercial Elites in Developing Countries,” (with Kevin Davis) (2001) 32 *Law & Policy in International Business* 331.

Michael Trebilcock and Andrew Smith, “State-Owned Enterprises in Less Developed Countries: Privatization and Alternative Reform Measures”; (2001) 12 *European Journal of Law and Economics* 217.



**PUBLISHED ARTICLES (cont'd)**

“Multidisciplinary Professional Practices: A Consumer Welfare Perspective,” (with Lilla Csorgo), (2001) 24 *Dalhousie L.J.I.*

“Designing Competition Law Institutions,” (with Edward Iacobucci), (2002) *World Competition* 361.

“Privatization and Accountability,” (with Edward Iacobucci), (2003) 116 *Harvard L.Rev.* 1622.

“Electricity Restructuring in Ontario: The Political Economy of a Short-Circuit,” (with Roy Hrab), CD Howe *Commentary*, November 2003 (33 pages).

“The Law and Economics of Immigration Policy,” (2003), *American Law and Economics Review* 271-317.

“Reforming Section 45,” (2003) *Competition Policy Record*.

“National Treatment and Extraterritoriality: Defining the Domains of Trade and Antitrust Policy,” (with Edward Iacobucci), in Richard Epstein and Michael Greve (eds.), *Competition Laws in Conflict*, (Washington, D.C.: AEI Press, 2004).

The Political Economy of Rule of Law Reform, (with Ron Daniels), forthcoming *Michigan Journal of International Law*.

“Electricity Restructuring in Ontario,” (with Roy Hrab), (2005) 26 *Energy Journal* 123.

“Merger Review in Regulated Industries,” (with Margaret Sanderson), (2005) 42 *Canadian Business Law Journal* 157.

“Critiquing the Critics of Economic Globalization,” (2005) 1 *Journal of International Law and International Relations* 213.

“Regulated Conduct in the Competition Act,” (2005) 41 *Canadian Business Law Journal* 492.

“The Canadian Experience with Deregulation,” (with Ralph Winter and Edward Iacobucci), (2006) 56 *U. of Toronto L.J.*

“Beyond Gridlock: The Case for Greater Integration of Regional Electricity Markets,” (with R. Pierce and E. Thomas), C.D. Howe *Commentary*, March 2006.

**PUBLISHED ARTICLES (cont'd)**

“The Economics of Emigration and Immigration, (with Matthew Sudak), (2006) 81 *New York University Law Review* 1, 234.

“The Role of Formal Contract Law and Enforcement in Economic Development (with Jing Leng), (2006) 92 *U. Virginia L. Rev.* 1517

**POLICY PAPERS, ACADEMIC REPORTS AND SUBMISSIONS**

Member, Adelaide Law School Committee, Report to the Standing Committee of Australian Commonwealth and State Attorneys-General on the law relating to Consumer Credit and Moneylending, (140 pp.) (South Australian Government Printer, July 1969)

Report (under contract) to the Canadian Minister of Consumer and Corporate Affairs on “The Problems of Product Quality in the Consumer Marketplace”, (180 pp.) (1971)

Position Paper (under contract) for the National Council of Welfare, Prices and the Poor, (1973)

A Study on Consumer Misleading and Unfair Trade Practices, (Information Canada, 1976) with others (2 vols.)

Three papers on Good Faith in Contracting, Unconscionability, and Disclaimer Clauses for the Ontario Law Reform Commission 1973-1974

“The Scope of Section 260 of the Income Tax Assessment Act” - 1967 South Australian Annual Convention of the Taxation Institute of Australia

Land Policy in Papua New Guinea, (with Knetsch) (published by the Institute of National Affairs, Port Moresby, 1981)

Public Enterprise in Papua New Guinea, (Institute of National Affairs, 1982)

The Role of the Private Sector in the Economic Development of Papua New Guinea (Institute of Natural Affairs 1983)

The Choice of Governing Instrument (with Hartle, Prichard and Dewees), Economic Council of Canada, 1982

**POLICY PAPERS, ACADEMIC REPORTS AND SUBMISSIONS (cont'd)**

Public Strategy and the Canadian Motion Picture Industry (with Lyon). Ontario Economic Council, 1982

Policy Options in the Regulation of Asbestos-Related Health Hazards (with Tuohy), Royal Commission on Asbestos, 1982.

“Public Participation in Collective Decision-making: The Question of Funding” (with Engelhart) (Economic Council of Canada, Regulation Reference, Working Paper, 1981)

“Case Studies in the Choice of Governing Instrument”, (with Hartle, Prichard and Dewees) (Economic Council of Canada, Working Paper, 1981)

A Survey of Industrial Policies in Selected OECD Countries (with Chandler), Macdonald Royal Commission, 1985

The Politics of Positive Sum, in Ottawa, Money and Power (ed. Courchene et. al). Ontario Economic Council, 1985

Adjusting to Trade: A Comparative Perspective, (with Chandler and Howse), Economic Council of Canada, Discussion Paper, December 1988

Medical Malpractice: An Empirical Analysis of the Canadian Experience (with Dewees and Coyte) (for Federal-Provincial Task Force on Malpractice Liability, 1989)

The Limits of Freedom of Contract: The Commercialization of Reproductive Materials and Services (with Martin, Lawson, and Lewis) (for the Royal Commission on New Reproductive Technologies, 1993)

The Role of the Civil Justice System in the Choice of Governing Instrument (with Howse) for the Civil Justice Review, Ontario Ministry of the Attorney General, 1996

**POLICY PAPERS, ACADEMIC REPORTS AND SUBMISSIONS (cont'd)**

The Future of the Toronto Stock Exchange: A Paradigm in Transition, (with Daniels) for the TSE, 1998

Creating a Human Capital Society for Ontario (with Daniels, Green, and Hrab), staff report prepared for the Panel on the Role of Government in Ontario, March 2004.

Regional Integration of Electricity Markets: A Comparative Perspective,” (with R. Pierce and E. Thomas) (submitted to *Regulation and Governance*).

Rerouting the Mail: Why Canada Post is Due for Reform (with Edward Iacobucci and Tracey Epps) (C.D. Howe Institute, 2007)

**WORK IN PROGRESS**

Regional Integration of Electricity Markets

Export Subsidies in International Trade

Rule of Law Reform and Development

Special and Differential Treatment in Agricultural Trade Liberalization

Reform of Economic Regulation of the Canadian Telecommunications Sector

**PERSONAL**

DATE OF BIRTH: September 15, 1941

CITIZENSHIP: Canadian

MARITAL STATUS: Married: Five children

## APPENDIX C

### CURRICULUM VITAE -- ADONIS JOHN YATCHEW

**OFFICE ADDRESS:** Department of Economics (416) 978-7128 voice  
University of Toronto 978-6713 fax  
150 St. George Street  
Toronto, Ontario  
Canada M5S 3G7 yatchew@chass.utoronto.ca

**CURRENT EMPLOYMENT STATUS:** Professor of Economics and Associate Chair for  
Graduate Studies, University of Toronto

#### **OTHER PROFESSIONAL ACTIVITIES:**

Editor-in-Chief, The Energy Journal (2006-present)

Editor, The Energy Journal, (2006)

Joint Editor (with G. Campbell Watkins) The Energy Journal (1997-2005)

Joint Editor (with Len Waverman) The Energy Journal (1995-1996)

Member, Editorial Board, Foundations and Trends in Econometrics

Editor (with Yves Smeers) 1997, Distributed Generation, special issue of the Energy Journal

Advisory Editor, Economics Letters (1985-1997)

Member, Advisory Board, *Eurasia Foundation*, 1995-2007

#### **AWARDS AND DISTINCTIONS:**

Teaching award: 1987 SAC APUS Teaching Award, University of Toronto

Top grade in Ontario, Royal Conservatory of Music, Toronto, Grade X Piano exam, 1969.

#### **DEGREES:**

Ph.D. Harvard University, Economics - 1980

M.A., University of Toronto, Economics - 1975

B.A., University of Toronto, Mathematics and Economics - 1974

Completed all practical exams for an A.R.C.T. in performance, piano, Royal Conservatory of Music, Toronto – 1972.

### **ACADEMIC EXPERIENCE:**

2005	Visiting Fellow, ARC Center of Excellence for Mathematics and Statistics of Complex Systems, Mathematical Sciences Institute, Australian National University
2004-present	Professor of Economics, University of Toronto
2001	Visiting Fellow, School of Mathematical Sciences, Australian National University
1986 to 2004	Associate Professor, Economics, University of Toronto
1989, 1990, 1991	Visiting Research Associate, Harvard University
1986	Visiting Fellow Commoner, Trinity College, Cambridge U.K.
1980 to 1986	Assistant Professor, Economics, University of Toronto
1984	Visiting Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts
1982 to 1984	Visiting Assistant Professor, University of Chicago
1976	Lecturer, University of Toronto, Scarborough College

### **REFEREED PUBLICATIONS:**

Pesando, J., and Yatchew, A., 1977, "Real vs. Nominal Interest Rates and the Demand for Consumer Durables in Canada", Journal of Money, Credit, and Banking, 428-436.

Yatchew, A., 1981, "Further Evidence on 'Estimation of a Disequilibrium Aggregate Labor Market'", Review of Economics and Statistics, 142-144.

Griliches, Z. and A. Yatchew, 1981, "Sample Selection Bias and Endogeneity in the Estimation of the Wage Equation: An Alternative Specification, Annales de l'Insee, 43, 35-46.

Yatchew, A. 1984, "Applied Welfare Analysis With Discrete Choice Models", Economics Letters, 18, 13-16.

Yatchew, A. 1984, "Generalizing the Composite Commodity Theorem", Economics Letters, 16, 15-21.

Bird, R., Bucovetsky, M., and Yatchew, A., 1985, "Tax Incentives for Film Production: The Canadian Experience", Public Finance Quarterly, Vol. 13, 396-421.

Epstein, L., and Yatchew, A., 1985, "The Empirical Determination of Technology and Expectations: A Simplified Procedure:", Journal of Econometrics, Vol. 27, 235-258.

Epstein, L., and Yatchew, A., 1985, "Nonparametric Hypothesis Testing Procedures and Application to Demand Analysis", Journal of Econometrics, Vol. 30, 149-169.

Yatchew, A., and Griliches, Z., 1985, "Specification Error in Probit Models", Review of Economics and Statistics, 134-139.

Yatchew, A., 1985, "A Note on Nonparametric Tests of Consumer Behaviour", Economics Letters, Vol. 18, 45-48.

Yatchew, A. "Multivariate Distributions Involving Ratios of Normal Variables", 1986, Communications in Statistics, Vol. A15, Number 6, Theory and Methods, 1905-26.

Yatchew, A., 1986, "Comment" on Frontier Production Functions, Econometric Reviews, Vol. 4(2), 345-352.

Yatchew, A., 1988, "Some Tests of Nonparametric Regression Models", Dynamic Econometric Modelling, Proceedings of the Third International Symposium on Economic Theory, W. Barnett, E. Berndt, H. White (eds.), Cambridge University Press, 121-135.

Yatchew, A., 1992, "Nonparametric Regression Tests Based on Least Squares", Econometric Theory, Vol. 8, 435-451.

Waverman, L. and A. Yatchew (1994), "The Regulation of Electricity in Canada", in International Comparisons of Electricity Regulation, R. Gilbert and E. Kahn, editors, Cambridge University Press, 366-405.

Yatchew, A. 1997, "An Elementary Estimator of the Partial Linear Model", Economics Letters, Vol. 57, pp.135-43. Vol. 59, 1998 403-5.

Yatchew, A. and L. Bos 1997, "Nonparametric Regression and Testing in Economic Models", Journal of Quantitative Economics, 13, 81-131, [www.chass.utoronto.ca/~yatchew](http://www.chass.utoronto.ca/~yatchew).

Yatchew, A. 1998, "Nonparametric Regression Techniques in Economics", Journal of Economic Literature, 36, 669-721.

Yatchew, A., 1999, "An Elementary Nonparametric Differencing Test of Equality of Regression Functions", Economics Letters, 271-8.

Yatchew, A., 2000, "Scale Economies in Electricity Distribution: A Semiparametric Analysis", Journal of Applied Econometrics, 15, 187-210.

Yatchew, A. and Joungyeo Angela No, 2001: "Household Gasoline Demand in Canada", Econometrica, 1697-1710.



Yatchew, A., Yiguo Sun and Catherine Deri, 2003: “ Efficient Estimation of Semi-parametric Equivalence Scales With Evidence From South Africa”, Journal of Business and Economic Statistics, 21, 247-257.

Hall, Peter and A. Yatchew, 2005: “Unified Approach to Testing Functional Hypotheses in Semiparametric Contexts”, Journal of Econometrics, 127, 225-252.

Yatchew, A. and W. Haerdle 2006: “Nonparametric State Price Density Estimation Using Constrained Least Squares and the Bootstrap”, Journal of Econometrics, 133:2, 579-599.

Ricciuto, L., V. Tarasuk and A. Yatchew 2006: “Socio-demographic Influences on Food Purchasing Among Canadian Households”, European Journal of Clinical Nutrition, 60:6, 778-790.

McCaig, B. and A. Yatchew 2006: “International Welfare Comparisons and Nonparametric Testing of Multivariate Stochastic Dominance”, forthcoming, Journal of Applied Econometrics.

Hall, Peter and A. Yatchew 2006: “Nonparametric Estimation When Data on Derivatives are Available”, forthcoming, Annals of Statistics.

## **BOOK**

Yatchew, A., 2003, Semiparametric Regression for the Applied Econometrician, 213 pages, Themes in Modern Econometrics, Cambridge University Press.

## **OTHER PAPERS / STUDIES**

Yatchew, A. 1995, "The Distribution of Electricity on Ontario: Restructuring Issues, Costs and Regulation", Ontario Hydro at the Millenium, University of Toronto Press, 327-342,353-354.

Yatchew, A. 1995, "Comments on The Regulation of Trade in Electricity: A Canadian Perspective", Ontario Hydro at the Millenium, University of Toronto Press, 165-7.

Yatchew, A. 2001: "Incentive Regulation of Distributing Utilities Using Yardstick Competition", Electricity Journal, Jan/Feb, 56-60.

Littlechild, S. and A. Yatchew, 2002: "Hydro One Transmission and Distribution: Should They Remain Combined or be Separated", [www.chass.utoronto.ca/~yatchew](http://www.chass.utoronto.ca/~yatchew) .

## **WORKING PAPERS**

Yatchew, A., 1999, "Differencing Methods in Nonparametric Regression: Simple Techniques for the Applied Econometrician, 86 manuscript pages.

## **RECENT RESEARCH GRANTS**

2004-2007 SSHRC grant "Semiparametric demand modeling and testing".

2003-2004: Grant to develop interactive web-based teaching software for undergraduate statistics at the University of Toronto.

2001-2004: SSHRC grant, "Efficient estimation of semiparametric equivalence scales"

## **SUPERVISION OF GRADUATE STUDENTS DURING THE LAST FIVE YEARS**

1. Brian McCaig -- Ph.D. student, Economics Department.
2. Laurie Ricciuto – Ph.D. student in the Department of Nutritional Sciences.

3. Angela No – Ph.D. student, Economics Department.
4. Yiguo Sun – Ph.D Student, Economics Department.
5. Catherine Deri – – Ph.D Student, Economics Department.
6. Toby Daghish, -- Ph.D. student in finance.
7. Marie Rekkas, Ph.D. student, Economics Department.
8. Each year I supervise 15-20 Ph.D. research papers (pre-thesis stage).

## **COURSES TAUGHT DURING THE LAST FIVE YEARS**

ECO 100 (Undergraduate): Introduction to Economics

ECO 220 (Undergraduate): Quantitative Methods / Statistics in Economics

ECO 2400F(Ph.D): Econometrics I.

ECO 2401S(Ph.D): Econometrics II

ECO 2403S (Ph.D): Special Topics in Econometrics

ECO 2404S (Ph.D): Empirical Applications of Economic Theory

## **SELECTED PROFESSIONAL EXPERIENCE:**

Member, Board of Directors, *EnerConnect*, 1998-2006

### **Electrical Utilities:**

(2006) Filed evidence before the Ontario Energy Board on incentive regulation of distribution utilities.

(2006) Filed evidence before the New Brunswick Board of Commissioners of Public Utilities on cost-sharing of joint-use power poles.

(2005) Prepared analysis on cost-sharing of power poles by cable companies. The analysis was part of the basis for a settlement proceeding in Ontario.

(2004) Prepared analysis on cost-sharing of power poles by cable companies. The document was filed before the Ontario Energy Board.

(2003) Testified before the Ontario Energy Board on distributor service area amendments.

(2003) Testified before the New Brunswick Board of Commissioners of Public Utilities on performance based regulation, benchmarking and rate of return issues

(1993-1998) Prepared major studies for the Municipal Electric Association on restructuring of the electric utility industry in Ontario

(1991-1992) Research Director for the Municipal Electric Association in their intervention before the Environmental Assessment Board in connection with Ontario Hydro's 25 year Demand/Supply Plan

(1992) Prepared testimony on forecasts of electricity demand for Ontario -- Environmental Assessment Board Hearing

(1982-1995) consultant to the Municipal Electric Association at the Ontario Hydro Rate Hearings before the Ontario Energy Board

**Airlines:** (1989) prepared technical analysis of the effects of booking system biases in a major U.S. litigation.

**Banking Industry:** (1997) Prepared analysis of securities lending for Canada Trust

**Bell Mobility:** (1991- 1994) prepared short term market assessment and forecasts for cellular telephone sales

**Competition / Antitrust:** (1990) prepared statistical analysis in connection with a legal proceeding on anti-competitive behavior relating to the supply of paper forms; (1989) prepared analysis in connection with the Imperial Oil/Texaco merger deliberations before the Federal Competition Tribunal

**Film Industry:** (1981), one of three co-investigators in study for Federal Government of tax incentives to the Canadian film industry

**Information Technology:** (1994) prepared cost allocation analyses.

**Probability Analysis:** (2004, 2005, 2006) prepared odds of winning prizes in promotions by international fast-food chain.

**Minerals:** (1985), performed econometric analysis of zinc, copper, potash markets as part of a larger study for Cominco

**Natural Gas:** (1985), coauthored a major background study for the Federal Government/Province of Alberta energy price negotiations; (2005), prepared statistical and economic analyses in litigation proceeding.

**Oil Pipelines:** (1987, 1992) coauthored studies on pipeline cost allocation.

**Parking Authority of Toronto:** (1985), designed data sampling scheme for Parking Authority of Toronto - to be used for monitoring flows into parking lots and as a broad audit check

**Toronto Transit Commission:** (1988, 1989, 1991), various studies on subjects such as subway reliability measures, evaluation criteria for resource allocation, statistical procedures in relation to count data