

Third-Party Certification in the Food System: Literature Review and the Need for a Broadened Research Approach

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**Presented at a Conference of the
Agricultural & Applied Economics Association
on “Economic Analysis and Food Safety:
The Food Safety Modernization Act”**



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Washington, DC
August 7, 2013

Overview of Third Party Certification Literature and Research Needs

Literature Review

- Asymmetric information Theory
- Principal-Agent Theory
- Relevant literature from other disciplines/policy issues

A model of principal-agent theory comparing the certifier acting as agent of alternative parties



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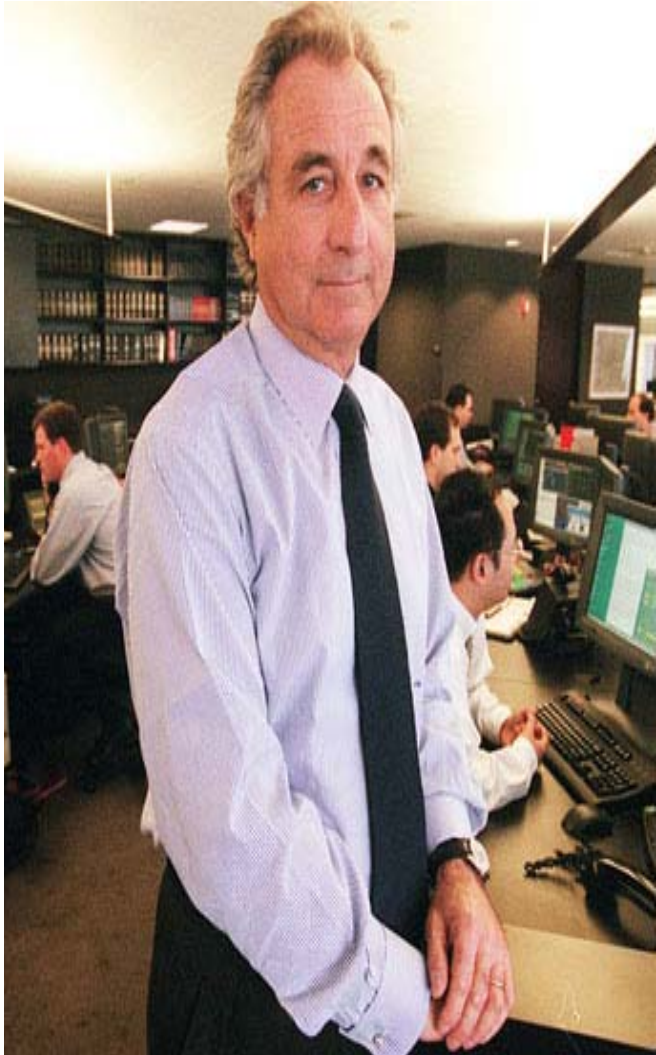
Conclusions: Research needs for the future

“(E)veryone, in selling his wares, will affirm that his wares are good.”

**--*Chandelor v. Lopus* (1603),
announcing the common
law rule of *caveat emptor***



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Stewart Parnell.
Peanut Butter
Salmonella Outbreak.
TPC to Kellogg's.



Bernard Madoff.
\$30-50 Billion Ponzi
Scheme.
TPC to SEC.



Marvin Renslow.
Pilot, Buffalo, NY
Airline Crash.
TPC to Conair.

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Asymmetric Information Literature

**“Consider a market in which goods are sold honestly or dishonestly; quality may be represented, or it may be misrepresented. The purchaser’s problem, of course, is to identify quality”
--Akerlof**



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Asymmetric Information Literature

Anders, Souza-Monteiro and Rouviere.

Examines effect of market characteristics of TPC market on competitiveness of certifiers.

A nested panel-model approach with data from the EuroGAP website, where the number of competing TPCs is regressed on structural parameters.

Conclusion: Countries with a higher exports of processed foods compared to fruits/vegetables positively affect TPC competition. Opposite for countries with high commodity export orientation.

Principal-Agent Literature

“A contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf, which involves delegating some decision-making authority to the agent.”

--Jenson and Meckling



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Principal-Agent Literature

“Third-party certifiers may have a comparative advantage, relative to other means of signaling product quality, if they are perceived as relatively more objective and independent.”

--Deaton



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Principal-Agent Literature

Resende-Filho

Examines effect of penalties/costs of buyer-induced food safety certification on sellers of raw materials with informational asymmetry.

Principal-agent model of buyer sourcing from several homogenous sellers. Traceability system rewards/disciplines sellers supplying safe materials.

Conclusion: If buyer can pass cost to sellers, traceability system transmits incentive to deliver safe products. Reliable traceability system can be used to signal product safety to consumers.

Principal-Agent Literature

Jahn, Schramm, and Spiller

Examines relationship of certifier to a standard owner, with standard owner seeking highest possible inspection standard.

Rational and risk-neutral agents tend to act opportunistically. Certifier minimizes cost under condition that higher audit quality increases (a) probability of discovery and (b) inspection costs.

Conclusion: Certifier's level of quality established where marginal inspection cost (cost of inspection plus lost revenue) equals marginal cost of deficient inspection (reputation cost plus liability cost).

Principal-Agent Literature

Peyrache and Quesada

Examines interaction of certifiers, buyers and sellers in a market in which seller-certifier collusion is possible.

Utility maximization model of certifiers, sellers and buyers. Probability of collusion is an endogenous variable determined by certifier's pricing strategy.

Conclusion: “Impatient” certifiers will reduce fees to attract low-quality managers, for whom the stakes of collusion are high.

Third-Party Certification Literature

Masters and Sanogo

Examines welfare effects to a certification program to provide assurance information on the nutritional density of infant formula.

Lancastrian model of consumer choice, analyzing product demands for individual product attributes. Willingness-to-pay data collected from gambling lottery.

Conclusion: Certification generates positive welfare gains, assuming costless information about certifiers.

Third-Party Certification Literature

Stahl and Strausz

Examines effect of buyer-induced versus seller-induced certification on social welfare and certifier profit.

In inspection strategy game, buyer-induced certification has mixed strategy equilibrium and seller-induced certification has separating equilibrium.

Conclusion: Certifier will/should sell services to better informed party (seller) -- maximizes both certifier's profit and social welfare. Conclusion based on assumption of honest certification.

Third-Party Certification Literature

Hamilton and Zilberman

Examines performance of certification program when (a) costly for buyers to determine environmental attributes of goods and (b) buyers assumed able to form rational expectations.

Models consumer demand for “green” and “brown” goods produced with alternative technologies. Fraud occurs when cost of disguising “brown” good as “green” good is less than the cost of producing “green” goods.

Conclusion: Positive marginal costs associated with producing and selling eco-certified goods, rather than subsidize the environmental technology, can reduce or mitigate fraud.

Third-Party Certification Literature

Crespi and Marette

Examines welfare effects of alternative fees for public certification programs under the various cost structures.

In single-period model, sellers choose (a) whether to produce “safe” products and (b) whether to certify products.

Conclusion: Per-unit fee has greatest welfare gains due to (a) information gains to buyers and (b) competition fostered among “safe” sellers.

Third-Party Certification Literature in Other Disciplines and Policy Issues

Easterbrook and Fischel/Grossman (Law)

Rule/penalty against fraud in securities may be lower cost alternative than TPC or other methods
Rule acts as an informational warranty for buyers.

Rule against fraud could also be used for certifiers (fraud in the certification).

Conclusion: Effectiveness of rule against fraud determined by cost of enforcement.



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Third-Party Certification Literature in Other Disciplines and Policy Issues

Easterbrook and Fischel/Milgrom and Roberts (Law)

Game theory of (a) one or many sellers and (b) one or many buyers. Buyers can range from “skeptically sophisticated” to “naively credulous” (“suckers”).

Outcome determined by (a) numbers on each side of transaction and (b) assumed behavior of buyers.

Conclusion: Effectiveness of rule against fraud determined by number of suckers among buyers. Presumably, TPC's can also fool suckers.



Third-Party Certification Literature in Other Disciplines and Policy Issues

Brown (Accounting)

Examines when rational auditor conducts rigorous, independent audit or colludes with manager in misrepresenting company's true condition.

Game theory of (a) manager, (b) accountant/auditor (certifier), and (c) the market (buyers).

Conclusion: Auditor can be “captured” in manner similar to public agency. In repeated games, no need for explicit collusion of auditor with manager. Auditor implicitly colludes to meet competition.



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A 3-Party Utility Maximization Model of Seller, Buyer and Certifier

Van Poppelen, Schweikhardt and Ross

Does the level of assurance achieved vary with the institutional structure among seller-buyer-certifier?

If information about the certifier is costly, does the level of assurance differ:

**(1) When the certifier is an agent of buyer
versus**

(2) When the certifier is an agent of seller



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A 3-Party Utility Maximization Model of Seller, Buyer and Certifier

Competitive seller/buyer market with 2 goods with and without a desired credence attribute.

Sellers/buyers maximize utility subject to prices of products, costs of production of products, fees for credence certification, consumer preferences for credence attribute.

Certifier maximizes utility subject to cost of service, audit quality/discovery probability, disguise costs created by seller, and value of business reputation.

▪ Audit quality/discovery: Certifier has technology or experience to discover quality, adjusts audit effort.

A 3-Party Utility Maximization Model of Seller, Buyer and Certifier

Van Poppelen, Schweikhardt and Ross

Assurance: A process in which third party expresses conclusion intended to enhance the degree of confidence that buyers can have about evaluation or measurement, against a criterion, of a product attribute that is the controlled by seller. (modified from Park and Brorson).

Cost of assurance: Fixed/variable costs of information regarding evaluation or measurement, against a criterion, of a product attribute.



Baseline Scenario

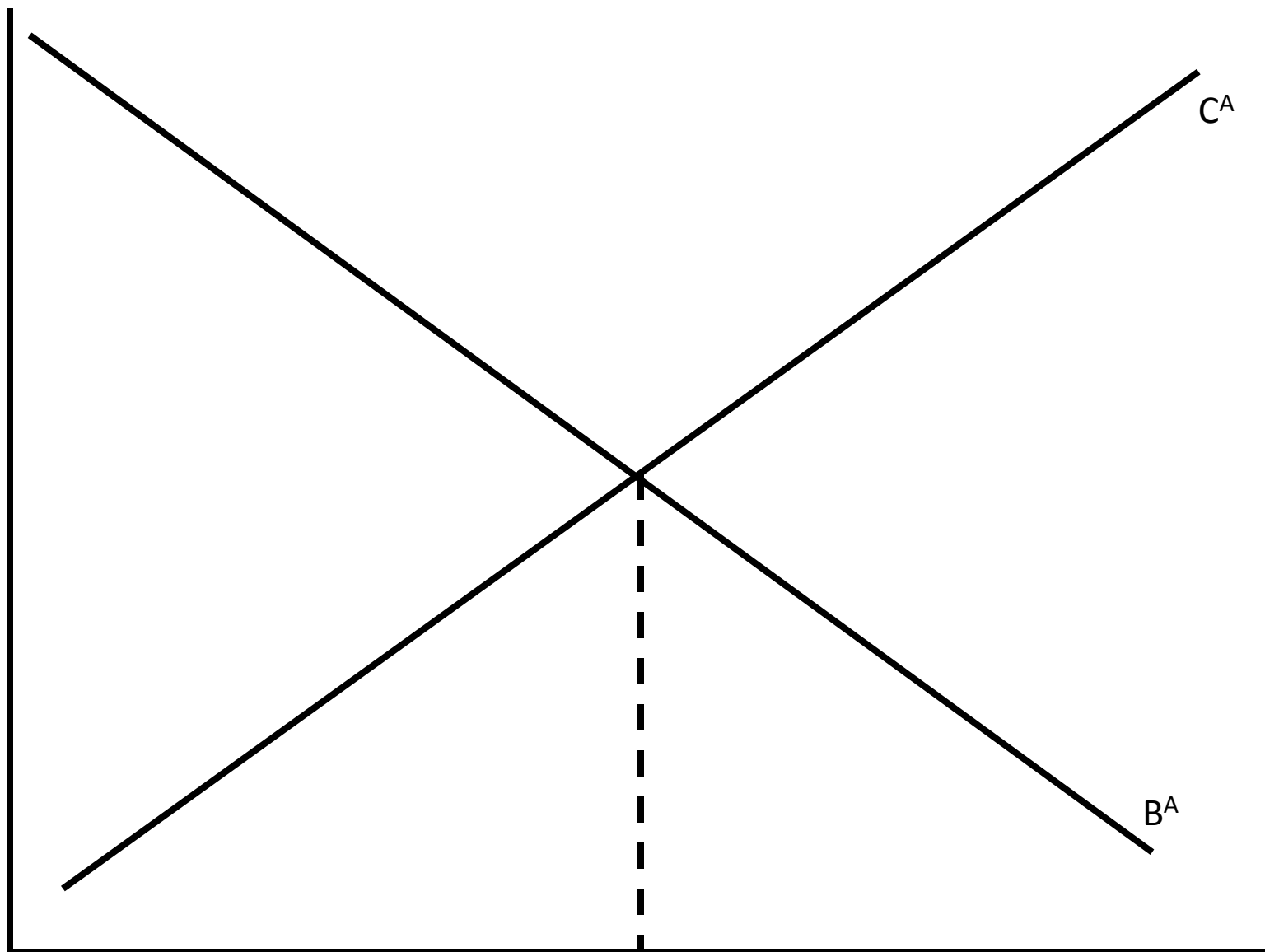
Baseline scenario: Transactions cost (cost of discovering quality) equal to zero.

Result: Marginal Cost of Assurance = Marginal Benefit of Assurance.

Conclusion: Outcome is similar to a Coasian negotiated outcome of externalities or Hand's economics of precaution in tort law.

Seller's Cost
of Assurance

Buyer's Benefit
of Assurance



Level of Assurance (A)

Q_A

Scenarios 2a and 2b

Scenarios 2a and 2b:

1. Transactions cost (cost of discovering quality) greater than zero.
2. Inspection cost of buyer greater than inspection cost of certifier.
3. Certifier an agent of buyer.

Result: Level of assurance greater with third party certification.

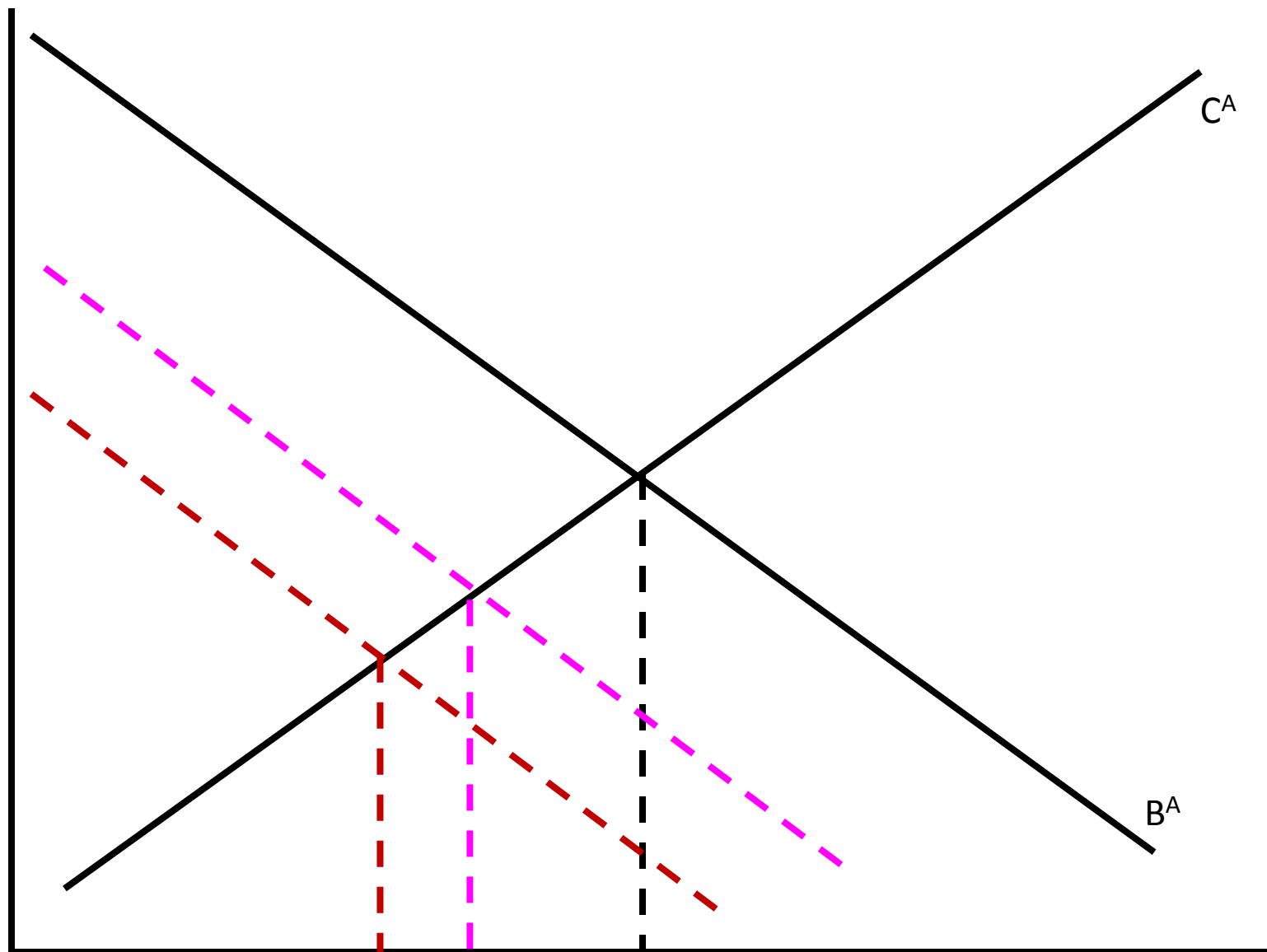
Conclusion: Difference in level of assurance reflects difference between buyer's and certifier's inspection cost.



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Seller's Cost
of Assurance

Buyer's Benefit
of Assurance



Level of Assurance (A)

Q_A

Scenarios 3a and 3b

Scenarios 3a and 3b:

1. Transactions cost greater than zero.
2. Inspection cost of seller greater than inspection cost of certifier.
3. Certifier an agent of seller.
4. Certifier assumed to be honest or buyer's inspection cost of certifier equals zero.

Result: Level of assurance greater with third party certification.

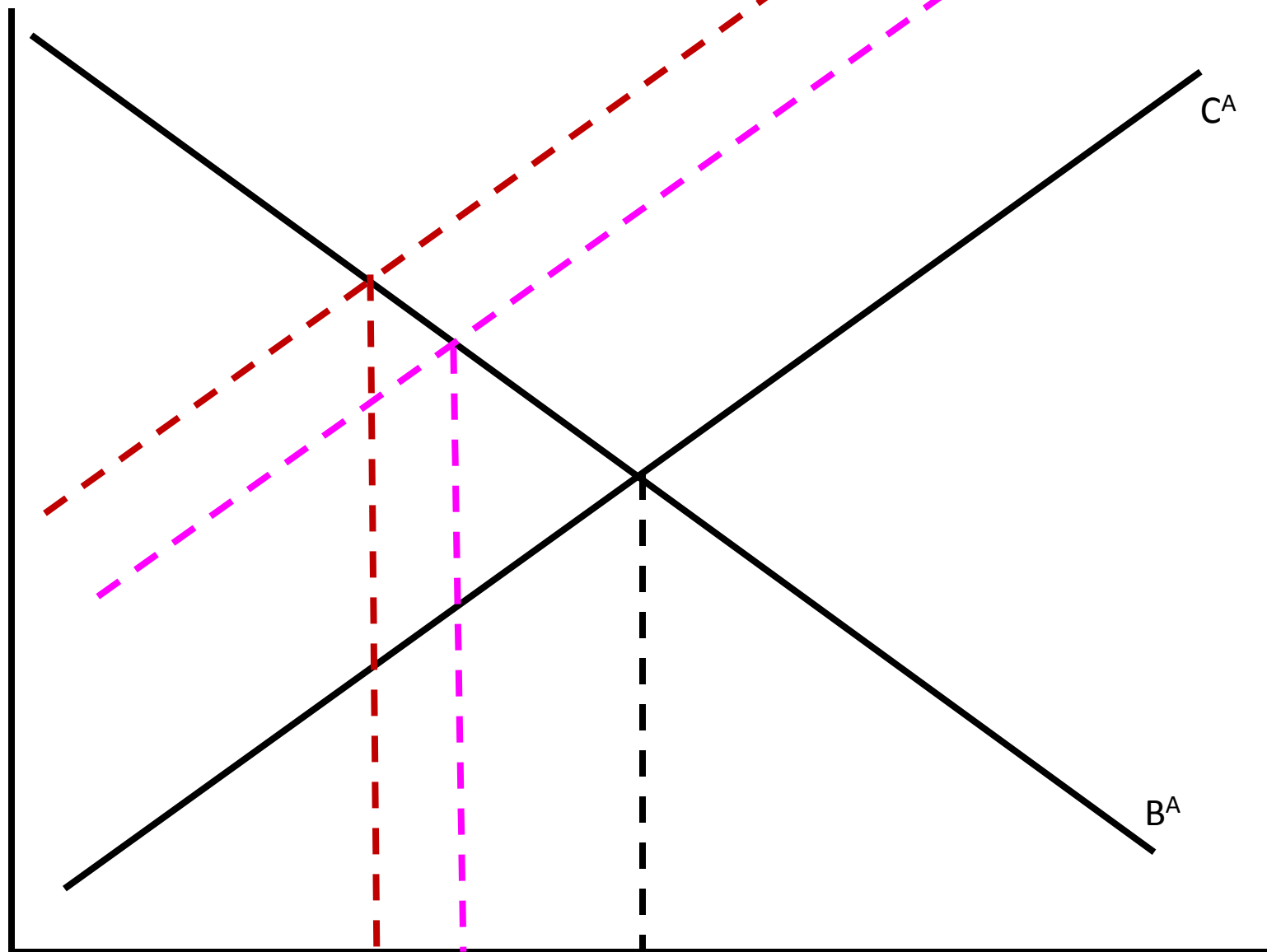
Conclusion: Difference in level of assurance reflects difference between buyer's and certifier's inspection cost.



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Seller's Cost
of Assurance

Buyer's Benefit
of Assurance



Level of Assurance (A)

Q_A

Scenario 4

Scenario 4:

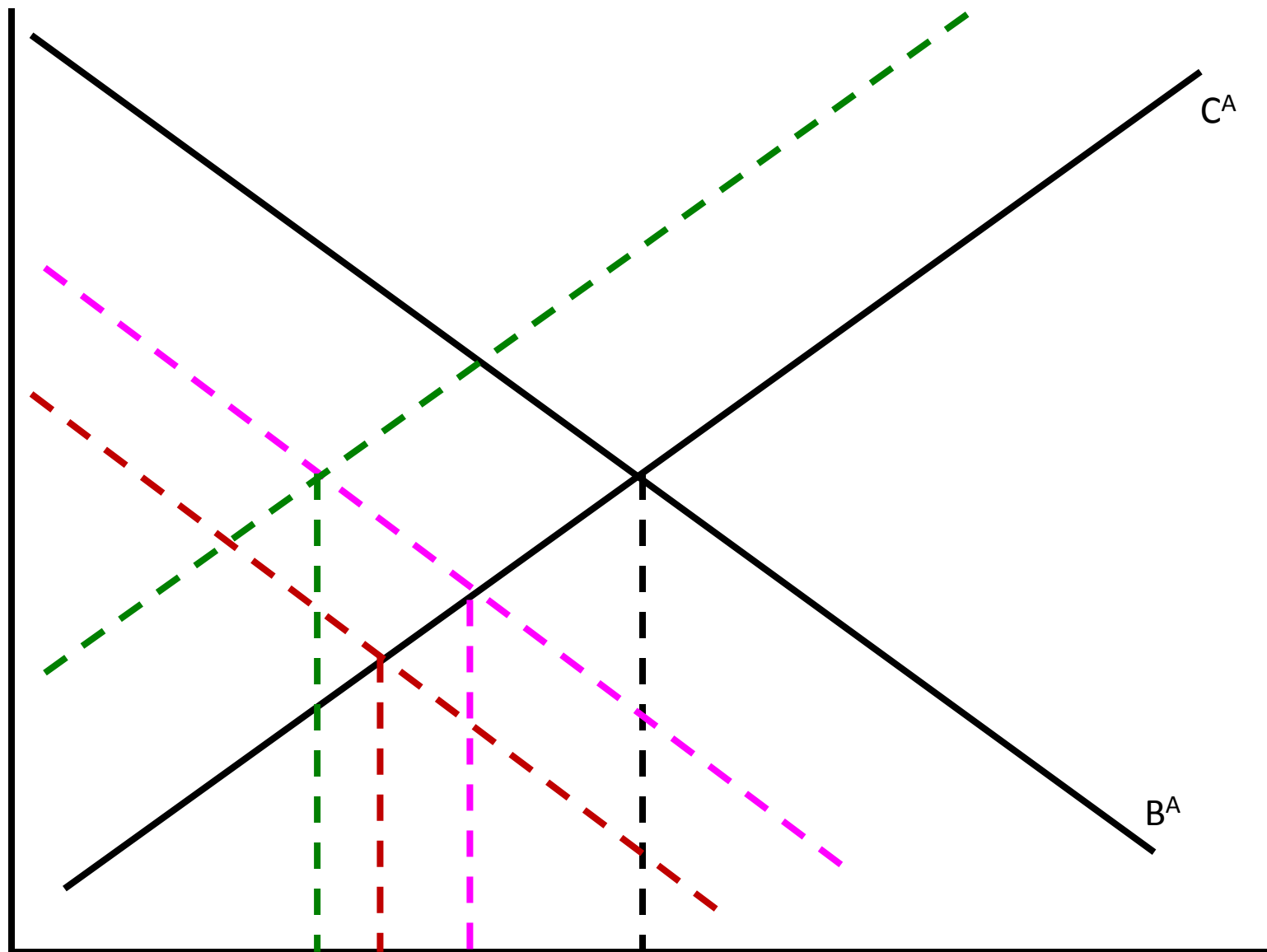
1. Transactions cost (cost of discovering quality) greater than zero.
2. Certifier the agent of buyer.
3. Seller creates deception costs that certifier must overcome (seller commits “perfect deception” similar to “perfect crime”).

Result: Level of assurance appears to certifier and buyer be higher than it actually is.



Seller's Cost
of Assurance

Buyer's Benefit
of Assurance



Level of Assurance (A)

Q_A

Scenario 5

1. Transactions cost (cost of discovering quality) greater than zero.
2. Certifier the agent of seller.
3. Certifier dishonest or buyer's inspection cost of certifier greater than zero.

Result: Seller and certifier become joint profit maximizers in deceiving buyer.

Conclusion: Potential for joint (massive?) fraud committed by seller/certifier on buyer.

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Conclusions: Research needs for the future

Conclusions and Research Needs

1. TPC likely to remain a central part of regulatory framework in food safety and other areas of policy.
2. TPC research now conducted in a wide range of disciplines and policy issues (securities regulation, environmental, etc.). Imports of intellectual capital into food safety research needed. Exports also.
3. To be relevant, TPC research must avoid “solving” problems of costly asymmetric product information with assumptions of costless symmetric certifier information.



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Conclusions and Research Needs

4. In addition to including information costs about the certifier, TPC research needs to consider other costs that affect the level of assurance.
5. Research needed on expanded range of behavioral assumptions for buyers and certifiers.
6. Research needed on repeated nature of certification process and long term incentives for certifiers.
7. Research needed on wide range of institutional alternatives for certification programs inside and outside food system.



References

Akerlof, G. (1970). "The market for 'lemons': Quality uncertainty and the market mechanism." *Quarterly Journal of Economics*. 488-500.

Anders, S., D. Souza-Monteiro, & E. Rouviere. (2010). "Competition and Credibility of Private Third-Party Certification in International Food Supply." *Journal of International Food & Agribusiness Marketing*. 22(3-4), 328-341.

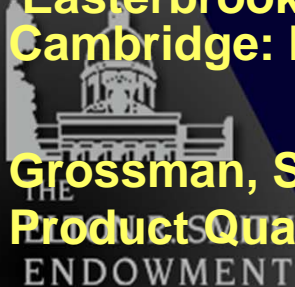
Brown, A. "The Economics of Auditor Capture: Implications for Empirical Research." Safra Center for Ethics, Harvard University. Cambridge, MA.
<http://abigailbrown.files.wordpress.com/2009/08/auditor-capture.pdf>

Crespi, J., & Marette, S. (2001). "How should food safety certification be financed?" *American Journal of Agricultural Economics*. 83(4), 852-861.

Deaton, B. (2004). "A theoretical framework for examining the role of third-party certifiers." *Food Control*. 15(8), 615-619.

Easterbrook F. and D. Fischel. *The Economic Structure of Corporate Law*. Cambridge: Harvard University Press, 1996.

Grossman, S. "The Informational Role of Warranties and Private Disclosure about Product Quality" *Journal of Law and Economics*. 24(1981): 461-483.



References

- Hamilton, S. F., and D. Zilberman. (2006). "Green markets, eco-certification, and equilibrium fraud." *Journal of Environmental Economics and Management*. 52(3): 627-644.
- Hatanaka, M., C. Bain, L. Busch. (2005). "Third-party certification in the global agrifood system." *Food Policy*. 30(3), 354-369.
- Jahn, G., M. Schramm, and A. Spiller. (2005). "The reliability of certification: Quality labels as a consumer policy tool." *Journal of Consumer Policy*. 28: 53-73.
- Jensen, M. and W. Meckling. (1976). "Theory of the firm: Managerial behavior, agency costs and ownership structure." *Journal of Financial Economics*. 3: 305-60.
- Masters, W. and D. Sanogo. (2002). "Welfare Gains from Quality Certification of Infant Foods: Results from a Market Experiment in Mali." *American Journal of Agricultural Economics*. 84(4): 974-989.
- Mercuro, N. and S. Medema. *Economics and the Law: From Posner to Postmodernism and Beyond*. Princeton, NJ: Princeton University Press, 2006 (graphical analysis of Coase Theorem).

References

Milgrom, P. and J. Roberts. "Relying on the Information of Interested Parties." *The RAND Journal of Economics*. 17 (1986): 18-32.

Park, J. and T. Brorson. "Experiences of and views on third-party assurance of corporate environmental and sustainability reports." *Journal of Cleaner Production*. 13 (2005): 1095-1106.

Peyrache, E., & Quesada, L. (2011). "Intermediaries, credibility and incentives to collude." *Journal of Economics and Management Strategy*. 20(4): 1099-1133.

Posner, R. *Economic Analysis of the Law*. New York: Aspen Publishers, 2010 (analysis of Hand rule of economics of precaution/tort).

Resende-Filho, M. "A Principal-Agent Model for Investigating Traceability Systems Incentives on Food Safety." European Association of Agricultural Economists Seminar 'International Marketing and International Trade of Quality Food Products', Bologna, Italy, March 2007.

Stahl, K. and R. Strausz "Who Should Pay for Certification?" ZEW - Centre for European Economic Research Discussion Paper No. 11-054. Available at SSRN: <http://ssrn.com/abstract=1908766> or <http://dx.doi.org/10.2139/ssrn.1908766>

**Presentation supported by the Elton R. Smith
Endowment in Agricultural and Food Policy**

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