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Assessing the Cartagena Protocol on Biosafety's Proposed Information Requirements in APEC: A Trade Flow Analysis

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Outline of Presentation

- 1. Introduction**
- 2. Information requirements and trade flows**
- 3. Effects of stringent requirements for APEC**
 - a. Potential benefits
 - b. Potential costs
- 4. Case studies: potential impact on six APEC economies under different scenarios**
 - a. Maize
 - b. Soybeans
 - c. Other crops: rapeseed and cottonseed, rice and wheat
- 5. Conclusions**



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1. Introduction: Motivations

- **Large share of agricultural trade is directly concerned**
 - Trade of Living Modified Organisms intended for direct uses as Food, Feed or Processing (LMO-FFPs) represent US \$26 billion/year, over 60% of total trade value of GM food, 90% of traded LMOs
- **Previous reports on GM producers & exporters**
 - Stringent information requirements are expected to have a significant cost on the USA (Kalaizandonakes 2004), Canada (JRG Consulting Group 2004), and Argentina (Direccion Nacional de Mercados Agroalimentarios 2004), three large GM exporters that are not members of the Cartagena Protocol on Biosafety (CPB). What about others?



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Proposed Information Requirements under the Cartagena Protocol on Biosafety

- **Current measure: shipment labeled “may contain GM”, risk information transmitted through Biosafety Clearing House**
- **Draft proposition, COP-MOP 2, March 2005:**
 - **Shipments with non intentional presence of GM - “may contain GM” with list of possible GM events**
 - **Intentional GM shipment - “does contain GM” with actual list of precise GM events**
 - **Threshold for adventitious presence of GM in non-GM shipment triggers precise information requirements, level depending on importers’ preferences**



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Proposed Information Requirements under the Cartagena Protocol on Biosafety

- In this study we assess the potential effects of:
 - “Does contain” with list requirements for the main GM crops directly concerned (maize, soybeans, rapeseed & cottonseed)
 - Information requirements in cases of adventitious presence of GM in non-GM shipments (rice & wheat)



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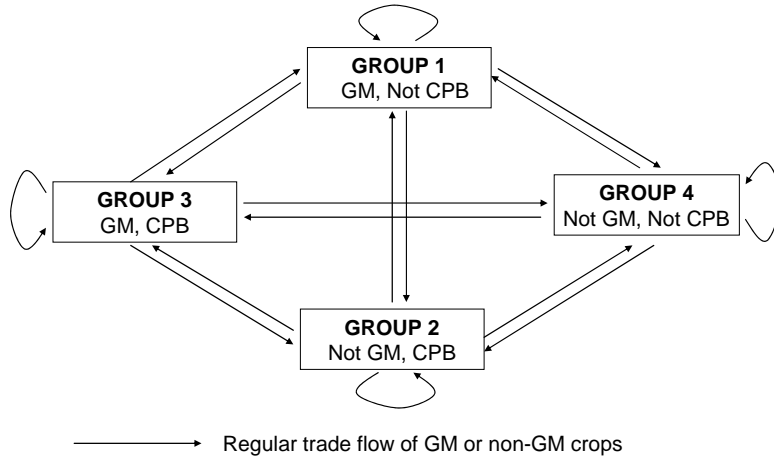
2. Information Requirements and Trade Flows

- Reasons for analyzing bilateral trade flows:
 - Not all trade flow will be affected by information requirements
 - There is a general lack of sense on the amplitude of GM or mixed GM/non-GM commodity trade
- We divide countries into four groups (overall and per crops):
 - Group 1: *GM producers, not members of CPB*
Examples: USA, Canada, Philippines
 - Group 2: *not GM producers, members of CPB*
Examples: Japan, Indonesia, Malaysia, Peru
 - Group 3: *GM producers, members of CPB*
Examples: China, Mexico
 - Group 4: *not GM producers, not members of CPB*
Examples: Russian Fed., Rep. Korea, Chile



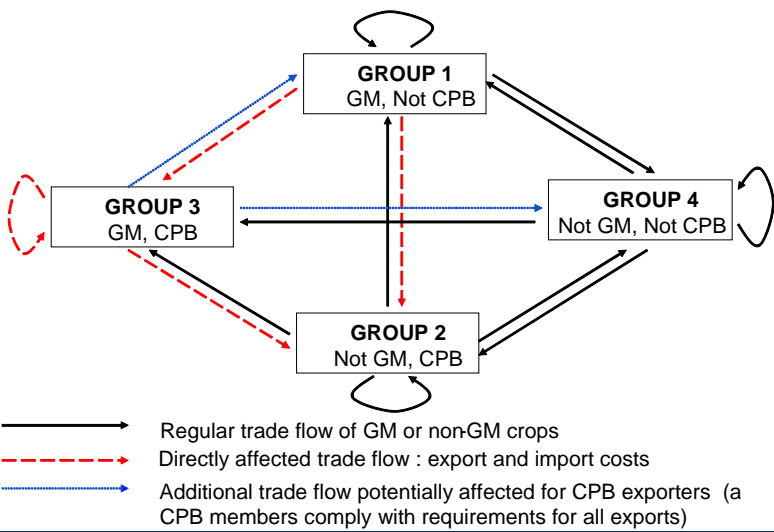
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Figure 1. International Trade Flows Before Implementation of the CPB Conceptual Framework under symmetric trade flows



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Figure 2. Short run effects with the implementation of stringent information requirements under the CPB



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3. Documentation Requirements in APEC

a. Potential benefits of stringent requirements

- “May contain” versus “does contain”: three differences
 1. More information. For countries with approval regulations:
 - *does contain* - tests for both approved and unapproved
 - *may contain* - only tests on unapproved
 2. Voluntary testing becomes mandatory for exporters of GM
 3. Provides a tool for a filtering import policy: rejecting only the unapproved GM events in case of shock, provided importers are not risk-averse and do not prefer to ban all GM imports



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3. Documentation Requirements in APEC

a. Potential benefits of stringent requirements

- Precise information versus imprecise testing results
 - *May contain* - imprecise information on shipments, type II errors: rejecting approved GM events
 - *Does contain* - More accurate information: list of precise GM events, but increase risk of type I errors: accepting unapproved GM events, because of imprecise testing results



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Potential Benefits: Discussion

- **Similar to the debate on GM food labeling**
 - *Does contain*: top-down approach, like mandatory labeling, provides information to users and non users, risk of encouraging traders to avoid GM crops
 - *May contain*: bottom-up approach, like voluntary labeling, provides basic information, allows more information to be exchanged, works well with proper market information (e.g., role of Biosafety Clearing House mechanism)



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Potential Benefits: Discussion

- **Threshold level of adventitious presence**
 - Useful clarification under “may contain” or “does contain”: no threshold means no enforcement is possible
 - Three main issues:
 - Level: too low \Rightarrow too costly (0%: impossible), too high \Rightarrow meaningless
 - Application coverage: GM commodities versus all traded commodities (grains)
 - International harmonization currently unlikely



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3. Documentation requirements in APEC

b. Potential costs of stringent requirements

- **Several types of costs**
 - **Infrastructure: fixed costs (potentially covered by CPB)**
 - **Testing and tracking: implementation variable costs**
 - **Cost of error: cargo waiting, rejections**
 - **Economic cost on world market: tariff like**
 - Losers: exporters of GM and consumers in all importing countries CPB members
 - Rent goes to testing companies, testing labs



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3. Documentation requirements in APEC

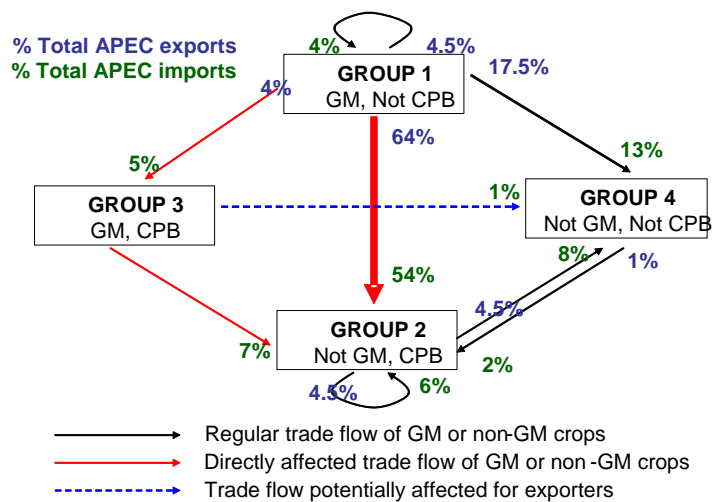
b. Potential costs of stringent requirements

- **Assessing implementation costs based on trade volumes**
 - **Analysis limited to testing and tracking costs**
 - **Costs = volume of trade concerned X unit cost**
 - **Used five-year average (2000-2004) trade volumes from UN Comtrade database, GM production from ISAAA 2005 and CPB membership until 12/1/2005**
 - **Large uncertainty on unit costs \Rightarrow our estimates of total costs are just indicative**



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**Figure 3. Trade flows of maize, soybeans, canola, cotton for APEC
TOTAL: 66-67% IMPORTS AFFECTED, 68% EXPORTS AFFECTED**



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**Estimated Trade Flows Directly Affected:
Maize, Soybeans, Rapeseed and Cottonseed (mt/yr)**

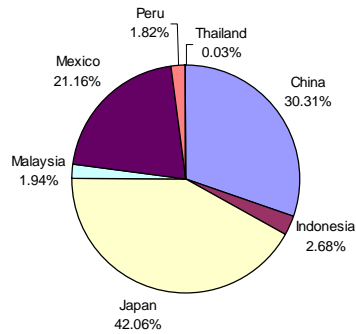
APEC economies	Overall Group	Import Volume Affected	Export Volume Affected
Australia	1	0	158,855
Brunei Darussalam	4	0	0
Canada	1	0	17,876,325
Chile	4	0	0
Pop. Rep. China	3	15,966,477	124
Hong Kong*, China	4	0	0
Indonesia	2	1,412,436	0
Japan	2	22,152,520	0
Rep. Korea	4	0	0
Malaysia	3	1,021,595	0
Mexico	2	11,147,226	701
New Zealand	2	2,010	0
Papua New Guinea	2	0	0
Peru	2	956,714	0
The Philippines	1	0	190
Russian Federation	4	0	0
Singapore	4	0	0
Chinese Taipei	4	0	0
Thailand	2	14,278	0
USA	1	0	55,558,561
Viet Nam**	2	4	0



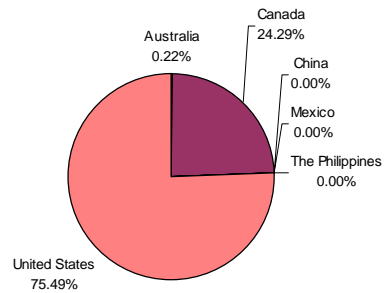
* We assume Hong Kong is not ratifying the Protocol in the short run. ** Incomplete data, only maize from FAOSTAT

Distribution of Volume Affected

Distribution of import volume affected in APEC based on current GM crops



Distribution of export volume affected in APEC based on current GM crops



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Approximate Total Costs for APEC under Ideal Conditions

Estimated minimum costs:
Assume testing/tracking costs like Canada

Import unit cost assumed* (\$/ton)	2	4	6
Export unit cost assumed* (\$/ton)	6	11	15
Total export costs (\$million)	444	814	809
Total import costs (\$million)	104	208	416
Total (\$million)	548	1,023	1,422
Extensions AP (\$million)	466	503	540
AP total (\$million)	1,014	1,526	1,962



*Source of unit cost: authors' choice, based on JRG Consulting (2004)

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4. Country Case Studies

- **Choice of six APEC economies**
 - **China:** CPB member, produces GM cotton (Group 3 for cotton, 2 for others)
 - **Mexico:** CPB member, produces GM cotton and soybeans (Group 3 or 2)
 - **Indonesia:** CPB member, no GM (Group 2)
 - **Peru:** CPB member, no GM (Group 2)
 - **Philippines:** not CPB member, GM maize producer (Group 1 or 4)
 - **Russia:** not CPB member, no GM crops (Group 4)



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a. Maize Trade Volume Affected

Maize (metric tons)	Scenario	Exports	Imports	Total
China (GRP2) <i>Large effect of adopting GM maize</i>	CPB Current situation	0	191	191
	CPB with GM maize (1)	4,267,305	191	4,267,496
	CPB with GM maize (2)	9,370,937	191	9,371,128
Mexico (GRP2) <i>Large maize importer directly affected</i>	CPB Current situation	0	5,932,121	5,932,121
	CPB with GM maize (1)	12,504	5,932,121	5,944,625
	CPB with GM maize (2)	45,906	5,932,121	5,978,027
Indonesia (GRP2) <i>Maize importer directly affected</i>	CPB Current situation	0	265,715	265,715
	CPB with GM maize (1)	35,354	265,715	301,069
	CPB with GM maize (2)	40,213	265,715	305,928
Peru (GRP2) <i>Maize importer directly affected</i>	CPB Current situation	0	904,271	904,271
	CPB with GM maize (1)	4,476	904,271	908,747
	CPB with GM maize (2)	5,280	904,271	909,551
The Philippines (GRP3) <i>Affected if enters the CPB</i>	Current situation	190	0	190
	CPB membership with GM maize (1)	190	117,470	177,560
	CPB membership with GM maize (2)	247	117,470	177,717
Russia (GRP4) <i>Exporter affected if ratifies the CPB</i>	Current situation	0	0	0
	GM maize	446	0	446
	CPB membership no GM	0	144,061	144,061
	CPB membership with GM maize (1)	446	144,061	144,507
	CPB membership with GM maize (2)	12,856	144,061	156,917



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- (1) Directly affected trade flow
 (2) Potentially affected trade flow for exporters (CPB members comply for all exports)

b. Soybeans Trade Volume Affected

Soybeans (metric tons)	Scenario	Exports	Imports	Total
China (GRP2) <i>Very large soybean importer directly affected</i>	CPB Current situation	0	15,316,600	15,316,600
	CPB with GM soybeans (1)	201,254	15,316,600	15,517,854
	CPB with GM soybeans (2)	247,974	15,316,600	15,564,574
Mexico (GRP3) <i>Soybean importer directly affected</i>	CPB Current situation	701	4,136,732	4,137,433
	CPB effects (2)	2,208	4,136,732	4,138,940
Indonesia (GRP2) <i>Soybean importer directly affected</i>	CPB Current situation	0	1,146,654	1,146,654
	CPB with GM soybeans (1)	439	1,146,654	1,147,079
	CPB with GM soybeans (2)	646	1,146,654	1,147,299
Peru (GRP2)	CPB Current situation	0	52,438	52,438
	CPB with GM soybeans (1)	8	52,438	52,446
	CPB with GM soybeans (2)	9	52,438	52,447
The Philippines (GRP4) <i>Affected if enters the CPB</i>	CPB Current situation	0	0	0
	CPB effects with GM	0	0	0
	Membership no GM	0	270,213	270,213
	Membership with GM (1)	0	270,213	270,213
	Membership with GM (2)	0	270,213	270,213
Russia (GRP4)	Current situation	0	0	0
	GM maize	11,838	0	11,838
	CPB membership no GM	0	19,845	19,845
	CPB membership with GM soybeans (1)	11,838	19,845	31,683
	CPB membership with GM soybeans(2)	12,657	19,845	32,502



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(1) Directly affected trade flow
(2) Potentially affected trade flow for exporters (CPB members comply for all exports)

c. Other Crops

- **Rapeseed, cottonseed**
 - **Current situation:** Mexico imports over one million tons, China imports 600,000 tons from GM producing countries
 - **With GM:** Russia would be concerned because it exports 36,000 tons of rapeseed
- **Rice, Wheat: Adventitious presence, GM**
 - **Current situation:** large effect with inclusion of wheat
 - Rice: imports in China (800,000t) and Mexico (700,000t)
 - Wheat: all CPB members affected (>1 million ton each, >7 million total four countries)
 - **With GM crops**
 - Rice: China 1.2 million tons (exports and imports)
 - Wheat: Russia 3.9 million tons exports
 - **Membership**
 - Philippines due to imports (60,000 t rice, 2.1 million t wheat)



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Potential Minimum Costs- Ideal Conditions (\$mil/yr)

Estimated minimum variable costs	China	Mexico	Indonesia	Peru	The Philippines	Russia
Current situation – four GM crops	32 to 96	22 to 67	3 to 8.5	2 to 6	Insignificant	0
Adventitious presence GM wheat and rice	5 to 29	6 to 20	1 to 4	1 to 5	Insignificant	0
Total AP and does contain	37 to 127	28 to 87	4 to 12	3 to 11	<0.01	0
Additional cost GM maize	25 to 140	0.08 to 0.7	0.2 to 0.6	Small	N/A	Insignificant
Additional cost GM soybeans	1 to 4	N/A	Small	Small	0	0.07 to 0.2
Additional cost GM rapeseed & cottonseed	0	0	0	0	Insignificant	0.2 to 0.5
Additional cost GM rice & wheat	8 to 53	10 to 31	4 to 7	3 to 8	Insignificant	0
Total Additional GM	39 to 198	10 to 32	4 to 7	3 to 8	<0.02	0.3 to 1
CPB Membership cost No technology	N/A	N/A	N/A	N/A	0.8 to 2.5	0.3 to 1



Assumptions (based on JRG Consulting 2004): For GM: import unit costs \$2-\$6/ton, exports: \$6-15/ton; For non-GM adventitious presence (AP): \$1-4/ton imports, \$4-8/ton exports.
N/A: Not applicable

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Three Lessons from APEC Country Case Studies

In addition to impose costs on GM exporters, stringent information requirements would:

1. Impose significant costs on Protocol members that are importers of the current GM crops and potentially other grains, due to the large share of GM producing countries in the world exports.
2. Impose a new entry cost for the adoption of current and future GM crops on Protocol members exporters especially if they export mainly to other CPB member countries.
3. Impose a potentially significant cost of entry for Protocol membership to new countries, thus potentially slowing the adoption of harmonized rules for traded living modified organisms.



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5. Conclusions

- **The benefits of “Does contain” with list requirements are debatable**
 - Risk reduction in case of shock: provides tool to control and filter import but might not prevent risk averse countries from banning all imports during crisis.
 - Voluntary versus mandatory: will impose information (useful or not) for all traders on all GM events, approved or not.
 - Information accuracy versus testing inaccuracies: type I error.
- **Stringent information requirements imply significant costs for both exporters and importers**
 - For APEC: 126 million tons directly concerned, minimum implementation cost \$1-2 billion/yr, distributed among traders, will increase with approval of new GM crops anywhere.
 - Uncertainty on unit cost, but likely to be much larger for developing countries.
 - New domestic barrier to entry for transgenic crops (current and new)



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5. Conclusions (end)

- **In addition to implementation costs:**
 - Price and trade impact likely, at the detriment of consumers
 - Looming trade conflicts (WTO versus Protocol), likely multiplication of non tariff barriers to trade (rejections)
 - Enforcement is going to be very difficult in all countries
- **Developing countries, members of the Protocol, are largely undervaluing the economic effects of stringent information requirements**
 - Each country should assess the full costs of information requirements for producers and consumers before supporting it



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Ongoing Work at IFPRI

South Asia Biosafety Program (SABP)
and Program on Biosafety Systems (PBS)



- **Country case studies: India, Bangladesh, Indonesia, Philippines**
 - Quantitative evaluation of international regulation effects on economic benefits of using GM crops with high productivity potential in poor areas (*drought tolerant rice*)
 - Simulation of economic effects of alternative domestic biosafety and marketing regulations



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