



Prion Disease Risk Management

Country Case Study Comparison

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Country Case Study Policy Comparisons

Objectives

- Review the chronology of BSE and vCJD in the individual countries.
- Compare the timing and policies used in various countries.
- Ascertain the various tools used to manage BSE and vCJD risks. New legislation, regulations, policies (in scope, timing and compliance), warnings, voluntary plans, surveillance systems, education, training and risk communication efforts that occurred in different countries.
- Determine a set of “best practices” and lessons learned for BSE and vCJD management.

Case Studies Work Method

- Qualitative literature review (PUBMED and grey literature searches) to assess expert and non-expert information for BSE and vCJD policy.
- Semi-quantitative and non-parametric statistics for country to country policy comparisons. Analysis to determine correlations between variables (timing of events and policies).

Master Table for BSE Events

For Each Country:

- BSE first detected (as reported by OIE)
- Number of BSE cases & Lead Agency
- Import ban on live cattle & Number of UK cattle imported until ban
- Number of cattle imported from other BSE affected countries
- Import ban on UK meat products and MBM
- Domestic MBM bans
- Meal ban for ruminant feed/human consumption (full feed ban)
- Passive surveillance
- Active surveillance (animals, feed for compliance)
- Specified risk materials ban
- BSE made a reportable disease
- Rendering Practices (year and type –brief description)

Country Case Studies: Qualitative Comparison

Asia

- China
- India
- Japan
- South Korea

European Union

- Belgium
- France
- Germany
- Italy
- Netherlands
- Portugal
- Spain
- Sweden
- Switzerland
- United Kingdom
- Czech Republic
- Poland
- Slovakia
- Slovenia
- Denmark
- Sweden
- Norway
- Finland

North America

- Canada
- United States

Eastern Europe

- Russia

Latin America

- Costa Rica

South America

- Brazil
- Argentina

South Pacific

- Australia
- New Zealand

Middle East

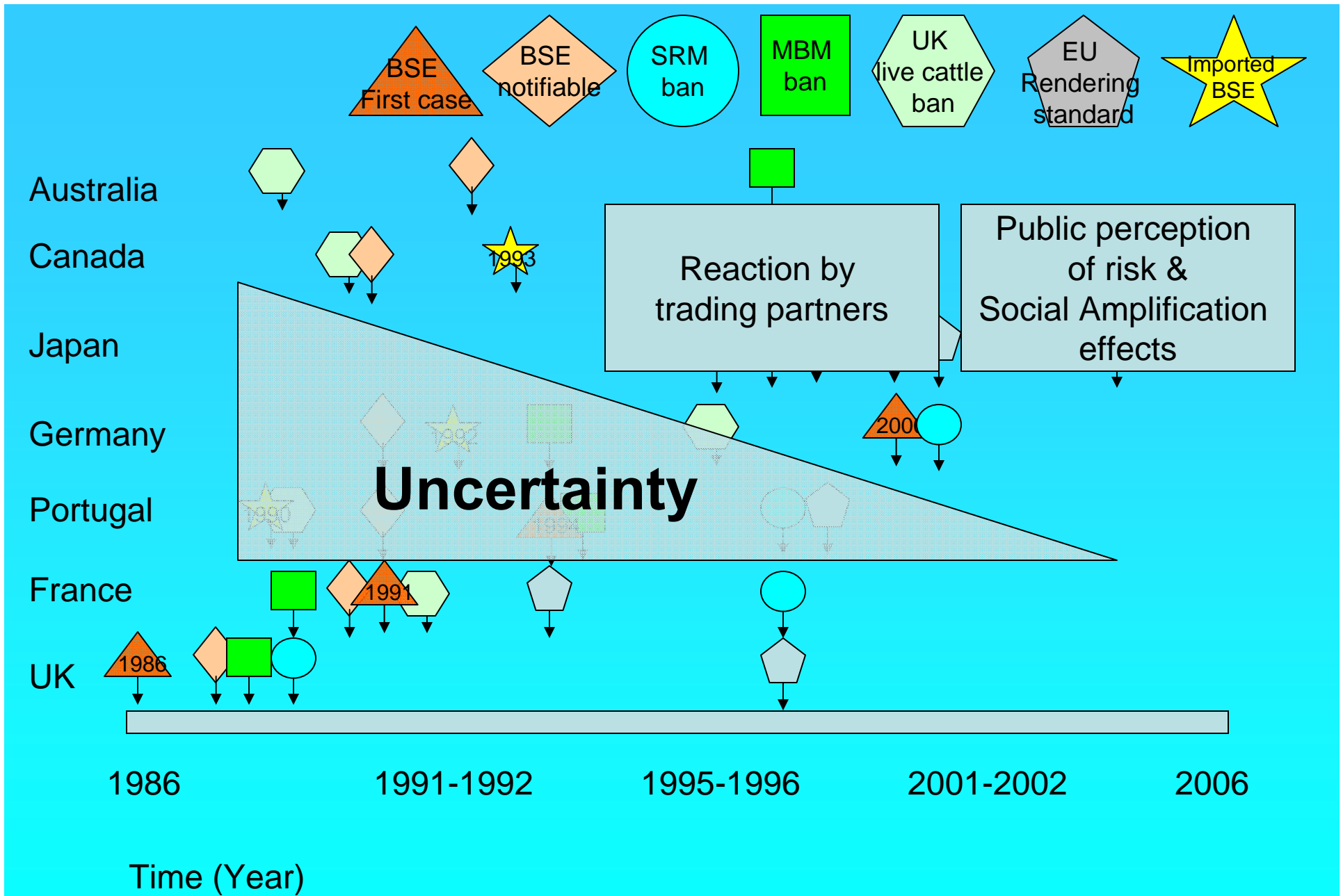
- Israel

Africa

- Regional

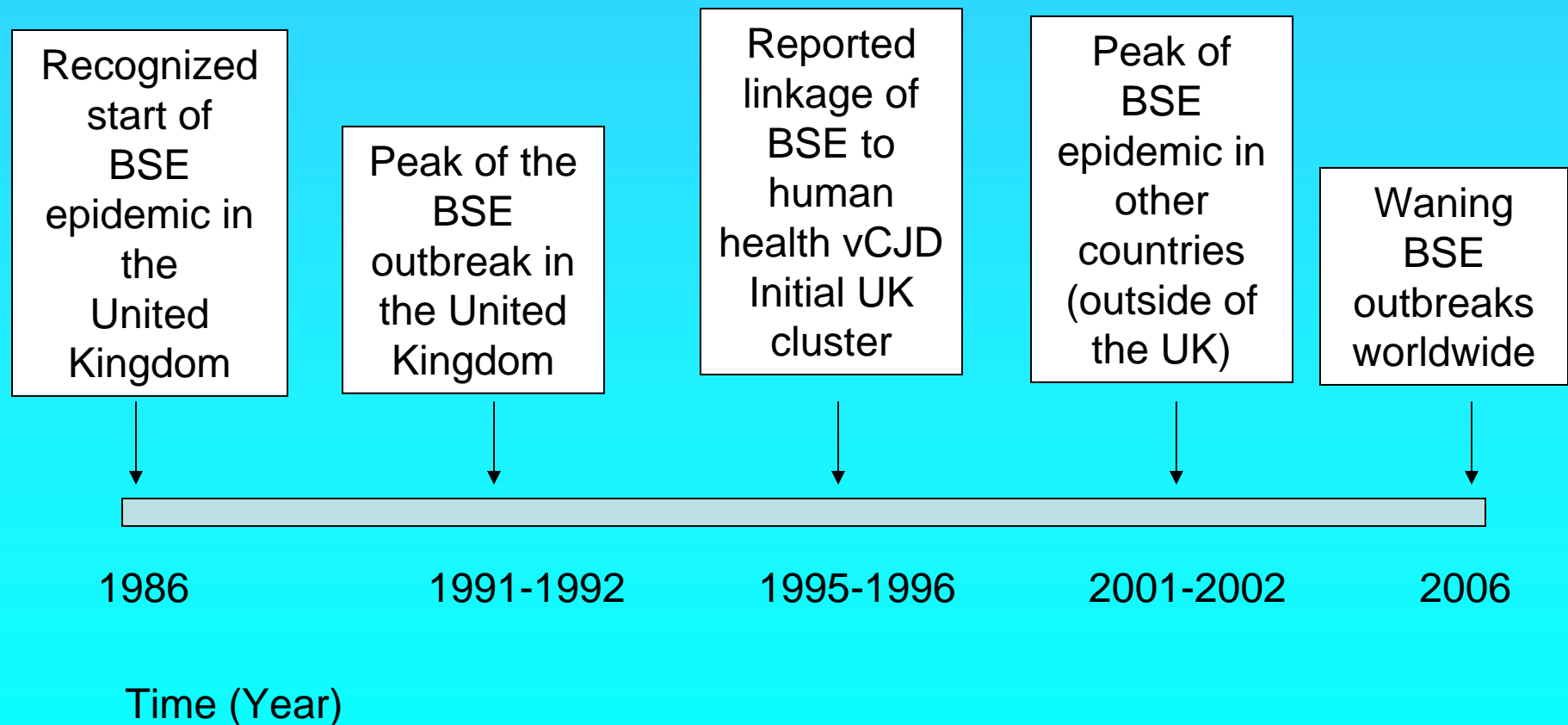
Others

- OIE Activity
- WHO Activity



Signal Events as Time Anchors

Signal Event as Time Anchor



External Challenge:

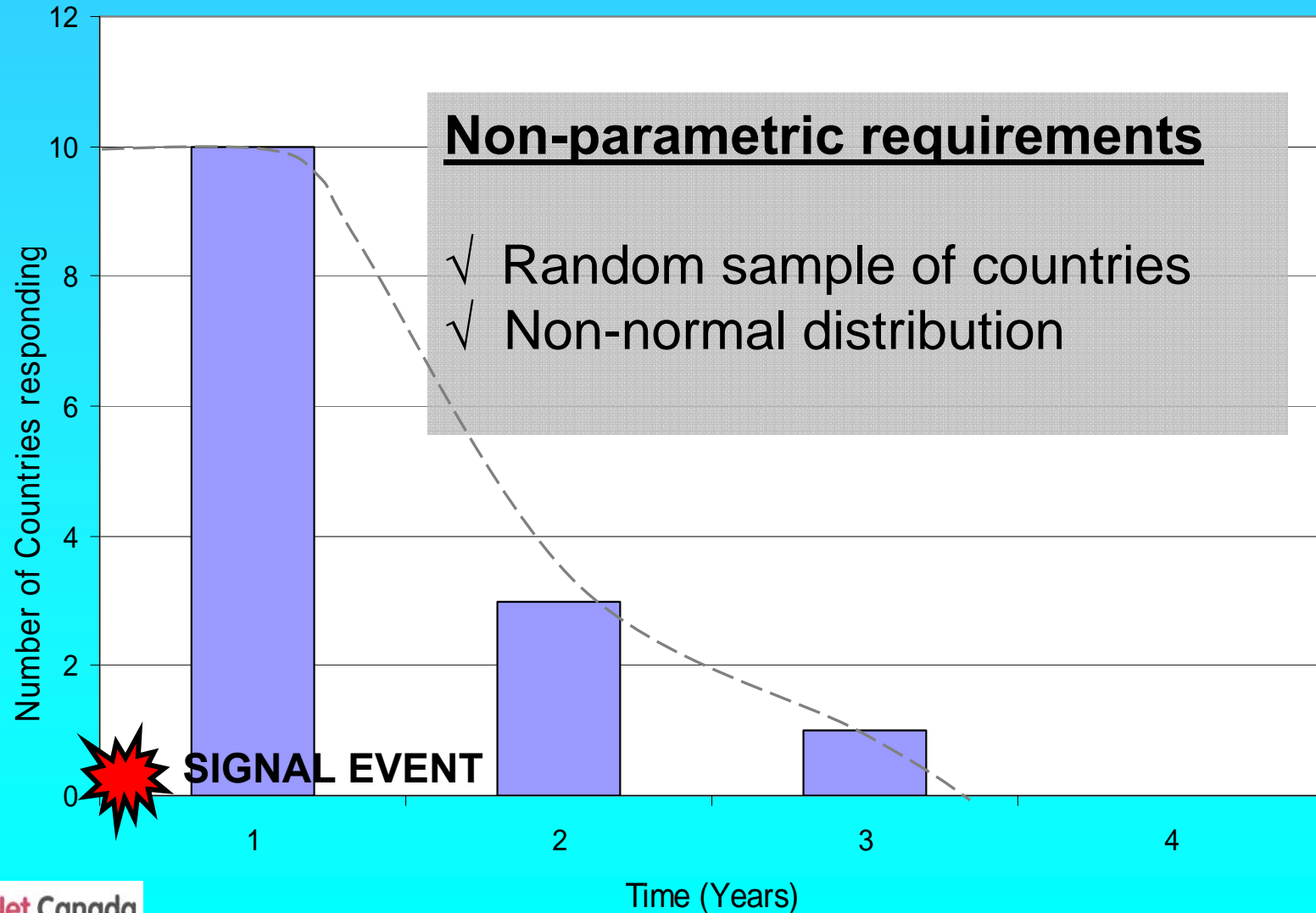
UK MBM bans and bans on live cattle imports from the UK.

Internal Challenge:

Removal of specified risk materials (SRMs), improved rendering for prion reduction and domestic feed bans to prevent ruminant to ruminant feeding.

(World Organization for Animal Health, 2001)

Expected Country Policy Response to BSE Signal Events



Country N=25	Domestic BSE (Year)	BSE Notifiable (Year)	UK MBM Ban (Year)	SRM Ban (Year)	Rendering EU standard (Year)	UK Cattle Ban (Year)
Argentina	na	1990	1995	2002	na	1990
Australia	na	1992	1997	na	na ^d	1988
Belgium	1997	1990	1994	1998	1997	1996
Brazil	na	1990	1996	na	na	1991
Canada	2003	1990	1997	2003	2004	1990
Costa Rica	na	2001	2001	na ^c	nc	1980 ^b
Czech Rep.	2001	1991	1991	2000	1962	1994
Denmark	2000	1990	1990	2000	1997	1990
France	1991	1990	1990	1996	1994	1990
Germany	2000	1990	1994	2001	na	1996
India	na	1998	1999	1999	1993	2001
Israel	2002	1992	1996	1996	2001	1988
Italy	2001	1991	1994	1996 ^d	2000	1996
Japan	2001	1996	1997	2001	2001	1997
Netherlands	1997	1990	1994	1997	1996	1988
New Zealand	na	1989	2000	na	nc	1998
Poland	2002	1997	1997	2001	1997	1987
Portugal	1994	1990	1994	1997	1998	1990
Russia	na	1990	1996	na	1990	1989
Slovakia	2001	1993	1994	nc	1962	1996
Slovenia	2001	1995	1996	1996	1981	1996
Spain	2000	1990	1994	2001	1997	1989
Switzerland	1990	1990	1996	1990	1998	1996
UK	1986	1988	1988	1989	1996	na
USA	2005	1986	1996	2004	nc	1989

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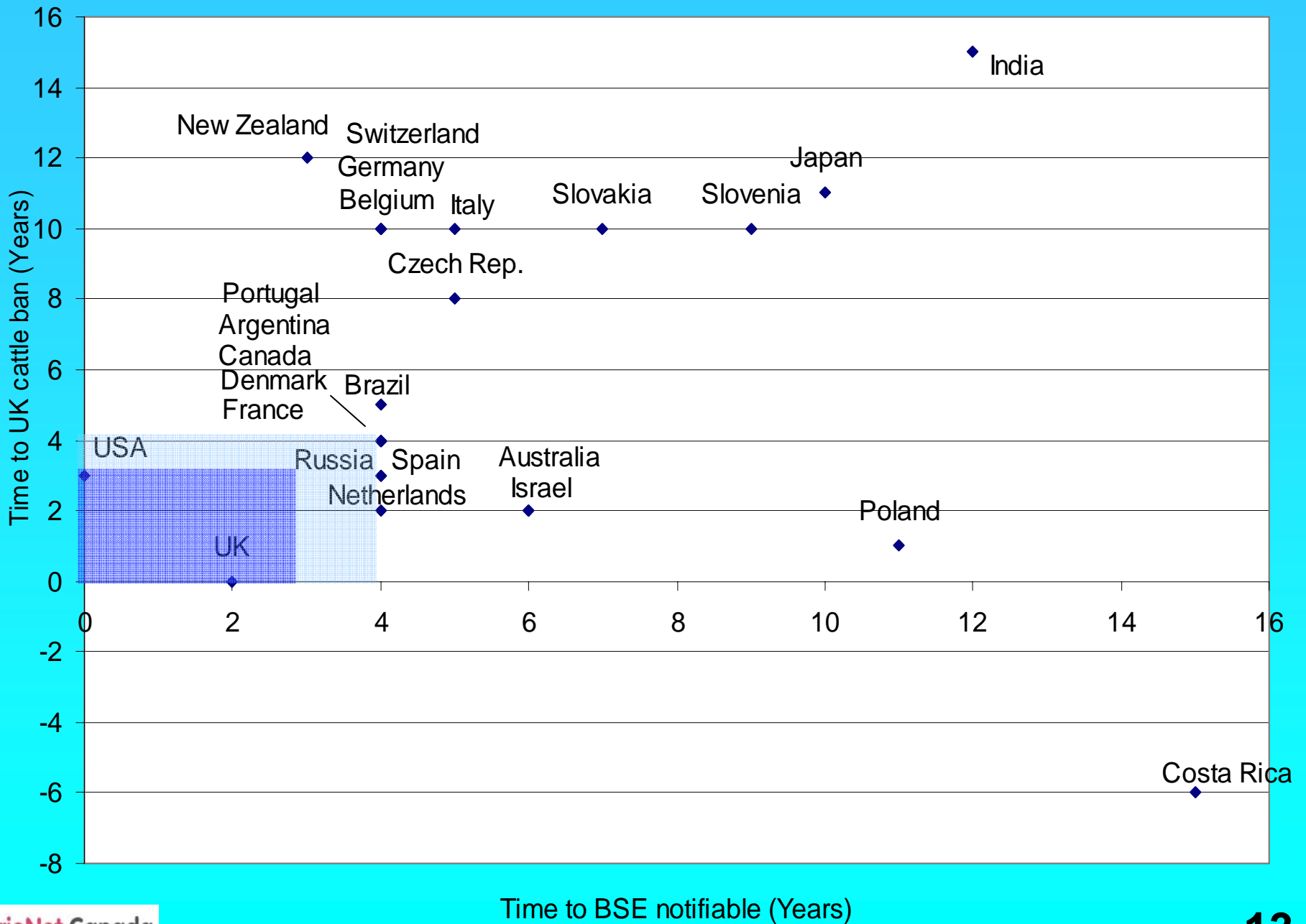
Arial 10 B I U

	C	D	E	F	G	H	I	J	K	L	N	O
1	Country	BSE domestic	BSE notifiable yr	MBM ban yr	SRM ban yr	EU rendering	Cattle ban yr		F1notifiable-1986	F1cattle ban -1986	F2 mbm-1986	F2 srm-1986
2	Argentina	na	1990	1995	2002	na	1990		4	4	9	16
3	Australia	na	1994	1997	na	na	1988		8	2	11	22
4	Belgium	1997	1990	1994	1998	1997	1996		4	10	8	12
5	Brazil	na	1990	1996	na	na	1991		4	5	10	22
6	Canada	2003	1990	1997	2003	2004	1990		4	4	11	17
7	Costa Rica	na	2001	2001	na	nc	1980		15	-6	15	22
8	Czech Rep.	2001	1991	1991	2000	1962	1994		5	8	5	14
9	Denmark	2000	1990	1990	2000	1997	1990		4	4	4	14
11	France	1991	1990	1990	1996	1994	1990		4	4	4	10
12	Germany	2000	1990	1994	2001	1997	1996		4	10	8	15
13	India	na	1998	1999	1999	1993	2001		12	15	13	13
14	Israel	2002	1992	1996	1996	2001	1988		6	2	10	10
15	Italy	2001	1991	1994	1996	2000	1996		5	10	8	10
16	Japan	2001	1996	1997	2004	2001	1997		10	11	11	18
17	Netherlands	1997	1990	1994	1997	1996	1988		4	2	8	11
18	New Zealand	na	1989	2000	na	nc	1998		3	12	14	22
20	Poland	2002	1997	1997	2001	1997	1987		11	1	11	15
21	Portugal	1994	1990	1994	1997	1998	1990		4	4	8	11
22	Russia	na	1990	1996	na	1990	1989		4	3	10	22
23	Slovakia	2001	1993	1994	nc	1962	1996		7	10	8	22
24	Slovenia	2001	1995	1996	1996	1981	1996		9	10	10	10
25	Spain	2000	1990	1994	2001	1997	1989		4	3	8	15
27	Switzerland	1990	1990	1996	1990	1998	1996		4	10	10	4
28	UK	1986	1988	1988	1989	1996	na		2	0	2	3
29	USA	2005	1986	1996	2004	nc	1989		0	3	10	18
44												

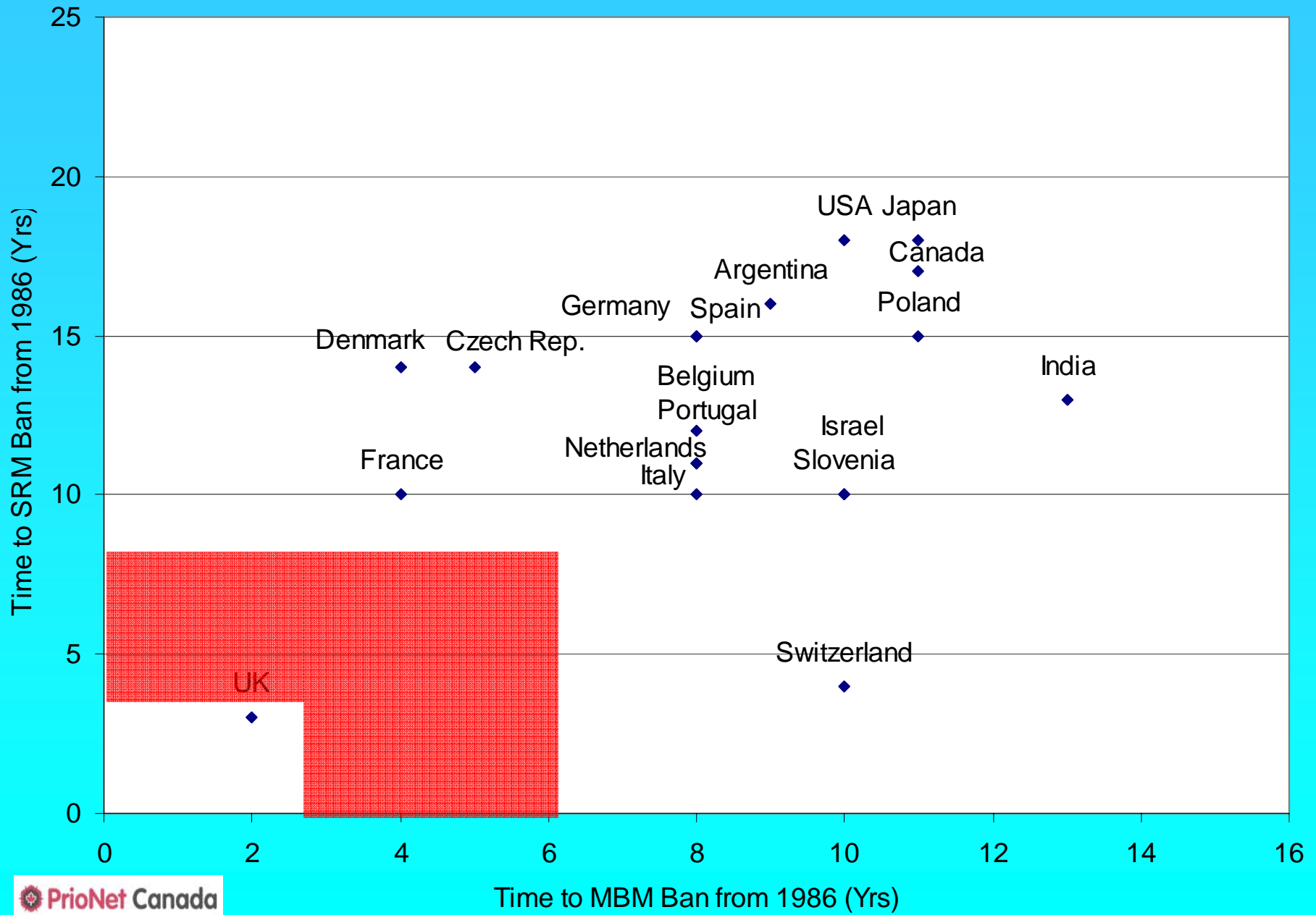
Time Anchors as Signal Events using Available Chronological Data

Hypothesis 1:

Awareness of BSE in the UK (1986) did not result in preventive policy responses to reduce external challenge levels (UK cattle ban).



Effect of UK BSE on External and Internal Policy Response



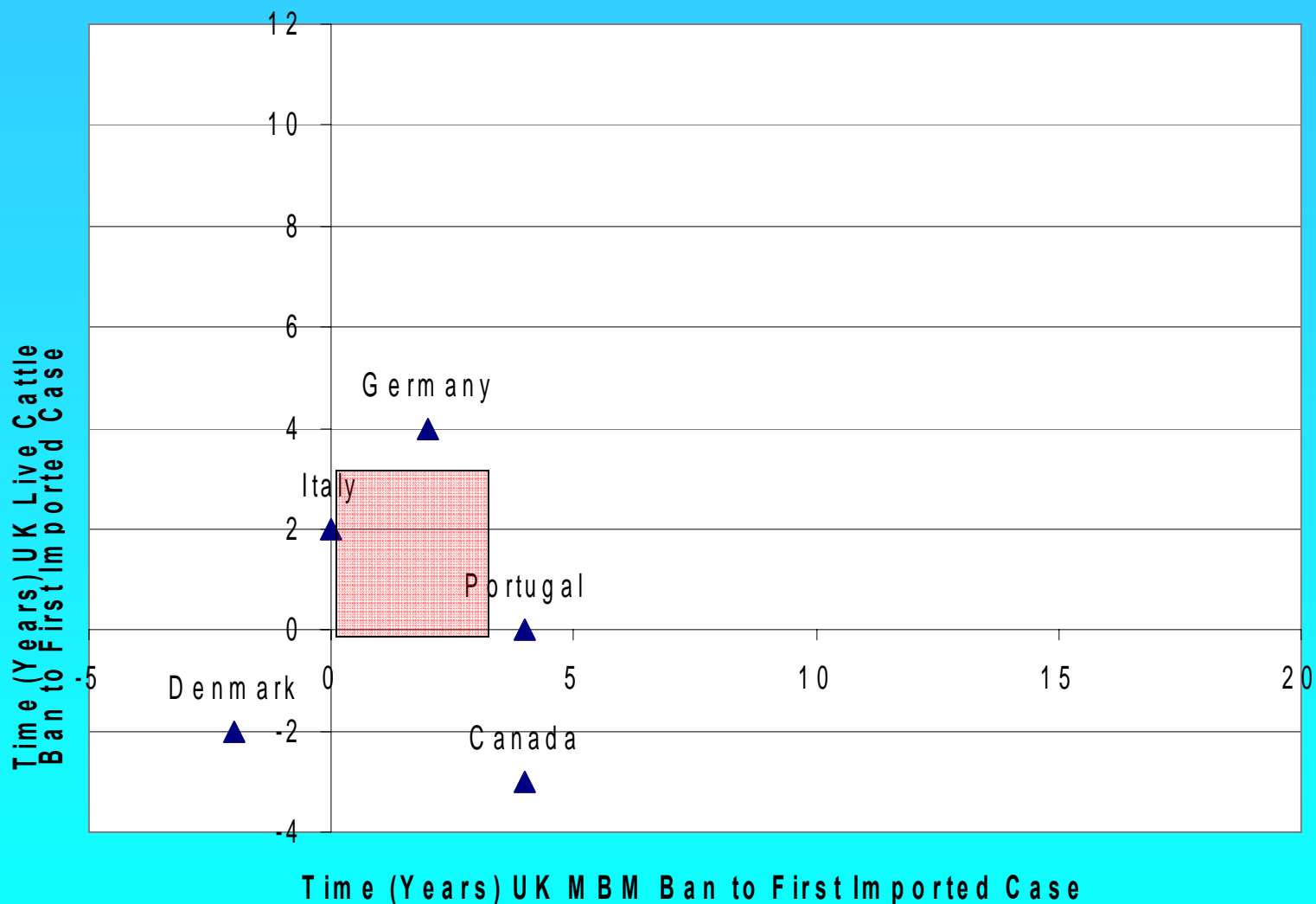
Hypothesis 2:

The occurrence of imported BSE acted as a driver for policy responses that reduced external challenge (live cattle ban and UK MBM ban) and internal challenge (SRM ban and rendering standards).

Countries with imported BSE reported by year and associated external bans for MBM, UK live cattle. Internal challenge reduction by SRM bans and year of EU rendering standard achieved country-wide also shown.

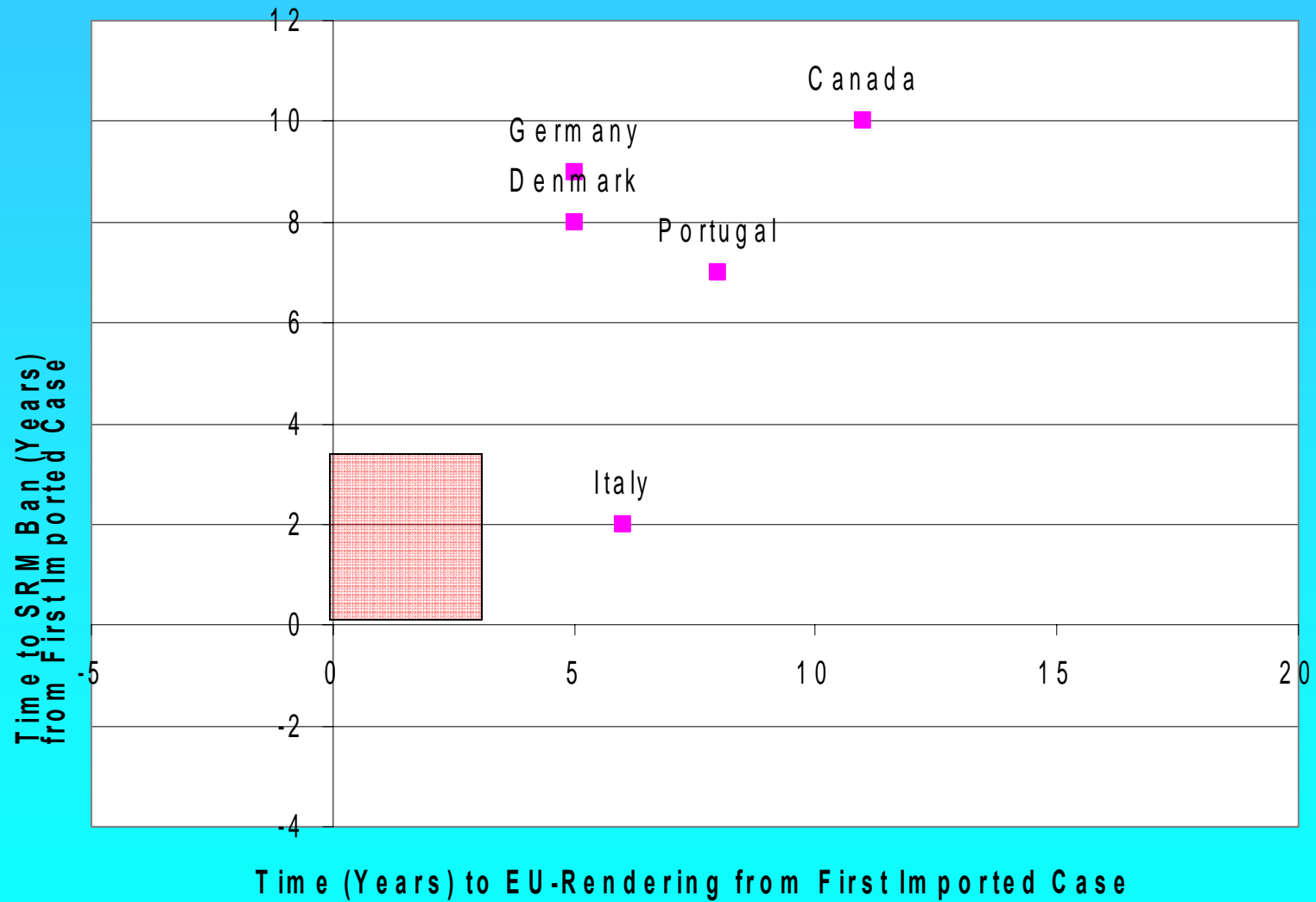
Country	Imported BSE (Year)	MBM Ban (Year)	UK Live Cattle Ban (Year)	EU rendering standard (Year)	SRM Ban (Year)
Denmark	1992	1990	1990	1997	2000
Canada	1993	1997	1990	2004	2003
Germany	1992	1994	1996	2008	2001
Italy	1994	1994	1996	2000	1996
Portugal	1990	1994	1990	1998	1997

Imported BSE and Impact on External and Internal Challenge Responses



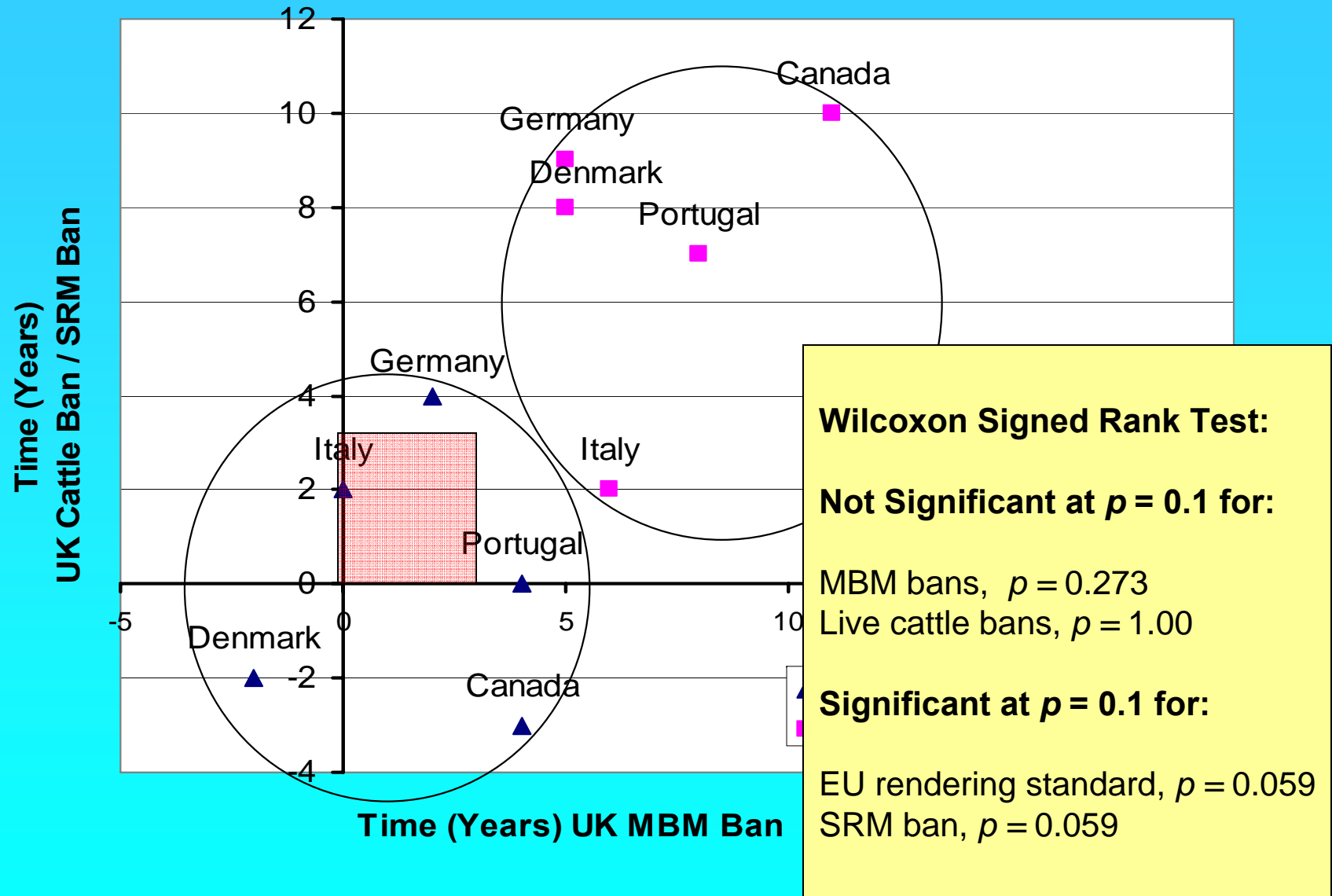
EXTERNAL RISK REDUCTION RESPONSE

Imported BSE and Impact on External and Internal Challenge Responses



INTERNAL RISK REDUCTION RESPONSE

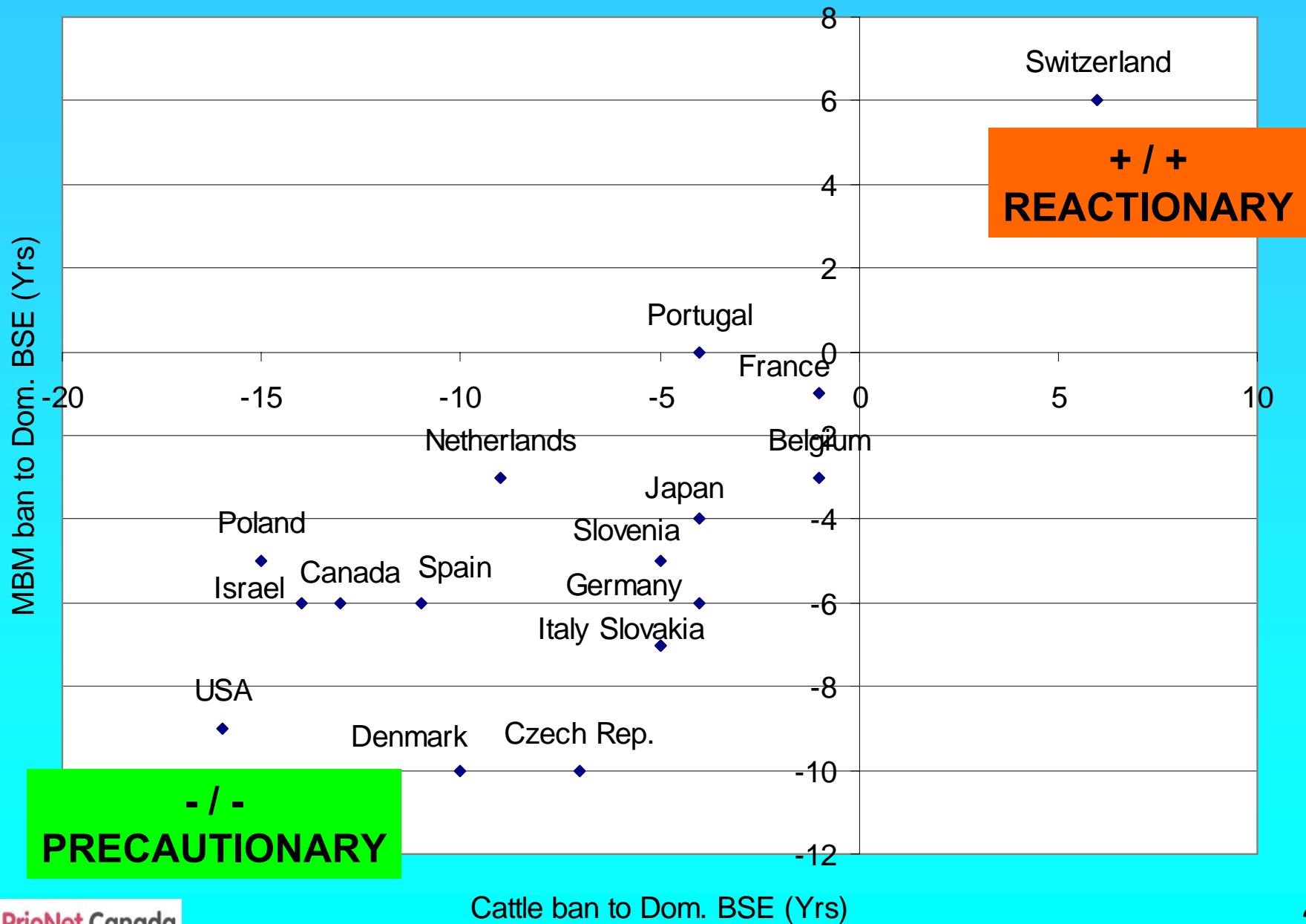
Imported BSE and Impact on External and Internal Challenge Responses



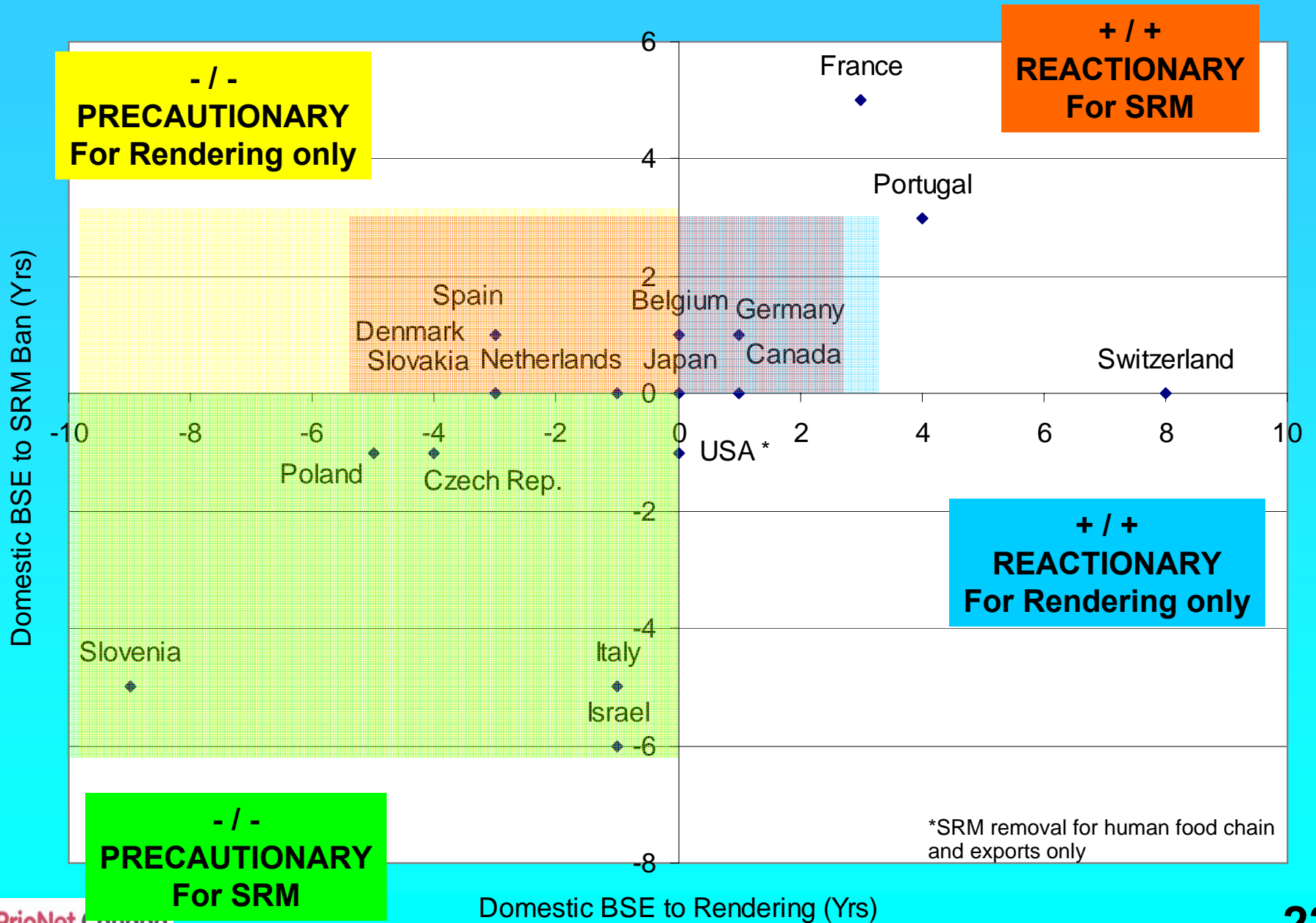
Hypothesis 3:

Domestic BSE acted as a policy driver for internal and external challenge reduction response.

Country Domestic BSE Compared to BSE External Challenge Bans



Country Domestic BSE Compared to BSE Internal Challenge Bans



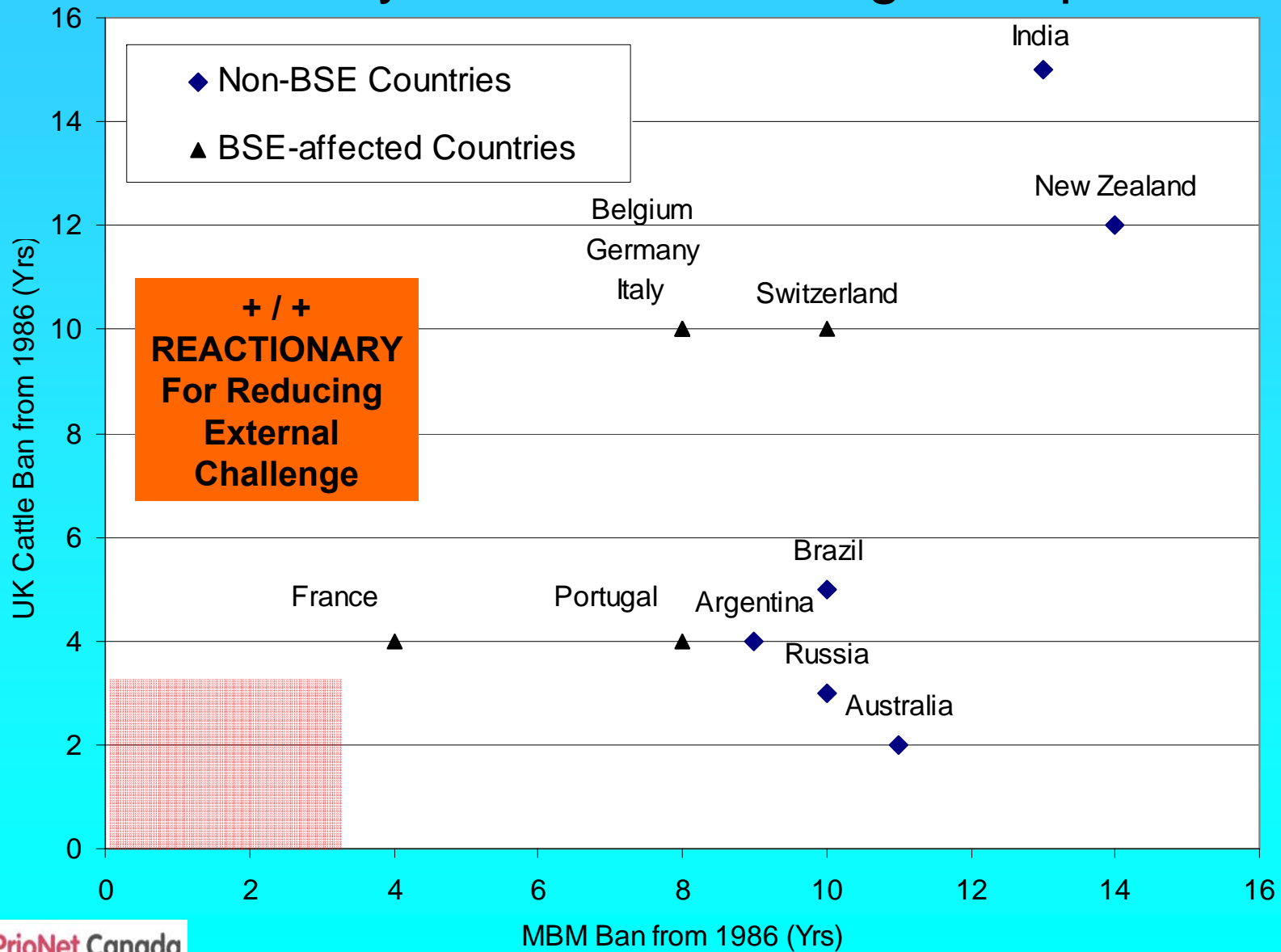
Hypothesis 4:

Non-BSE countries acted in a more precautionary manner to reduce external challenge of BSE as compared to the greatest BSE-affected countries excluding the United Kingdom.

Non-BSE (Group 1): Argentina, Australia, Brazil, India, New Zealand and Russia

BSE-affected (Group 2): Belgium, France, Germany, Italy, Portugal and Switzerland.

Non-BSE versus BSE-affected for Precautionary External Challenge Response



Mann Whitney Two Sample Test

Median Time to reduce the external risk by non-BSE countries (UK MBM) is significantly different from BSE-affected countries (longer in time).

Median Time to reduce the external risk by non-BSE countries (UK Cattle) is not significantly different from BSE-affected countries.

Median Times to MBM Bans

Time to external MBM risk reduction non-BSE (n=6): 10.5

Time to external MBM risk reduction BSE-affected (n=6): 8.0

W = 55.0

Point estimate for ETA1-ETA2 is 3.00; 95.5 Percent CI for ETA1-ETA2 is (-1.001,6.001)

Test is significant at 0.0131; The test is significant at 0.0109 (adjusted for ties)

P=0.0109 is < 0.05 therefore reject H0 that the means are equal.

Median Times to UK Cattle Bans

Time to external UK cattle risk reduction non-BSE (n=6): 4.5

Time to external UK cattle risk reduction BSE-affected (n=6): 10.0

W = 36.0

Point estimate for ETA1-ETA2 is -1.500; 95.5 Percent CI for ETA1-ETA2 is (-7.000,4.997)

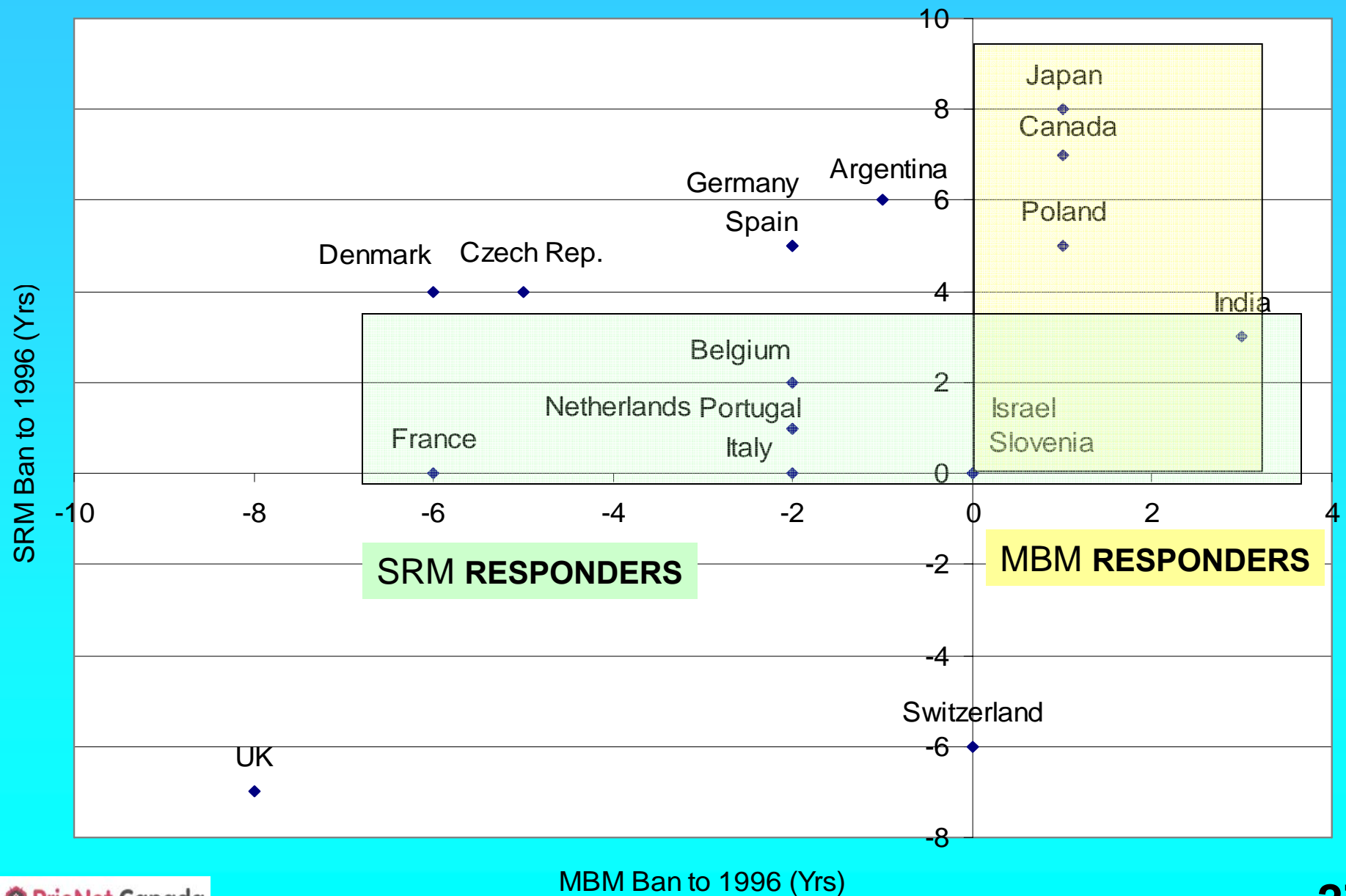
Test is significant at 0.6889; The test is significant at 0.6814 (adjusted for ties)

P = 0.6814 is > 0.05 therefore accept H0 that the means are equal.

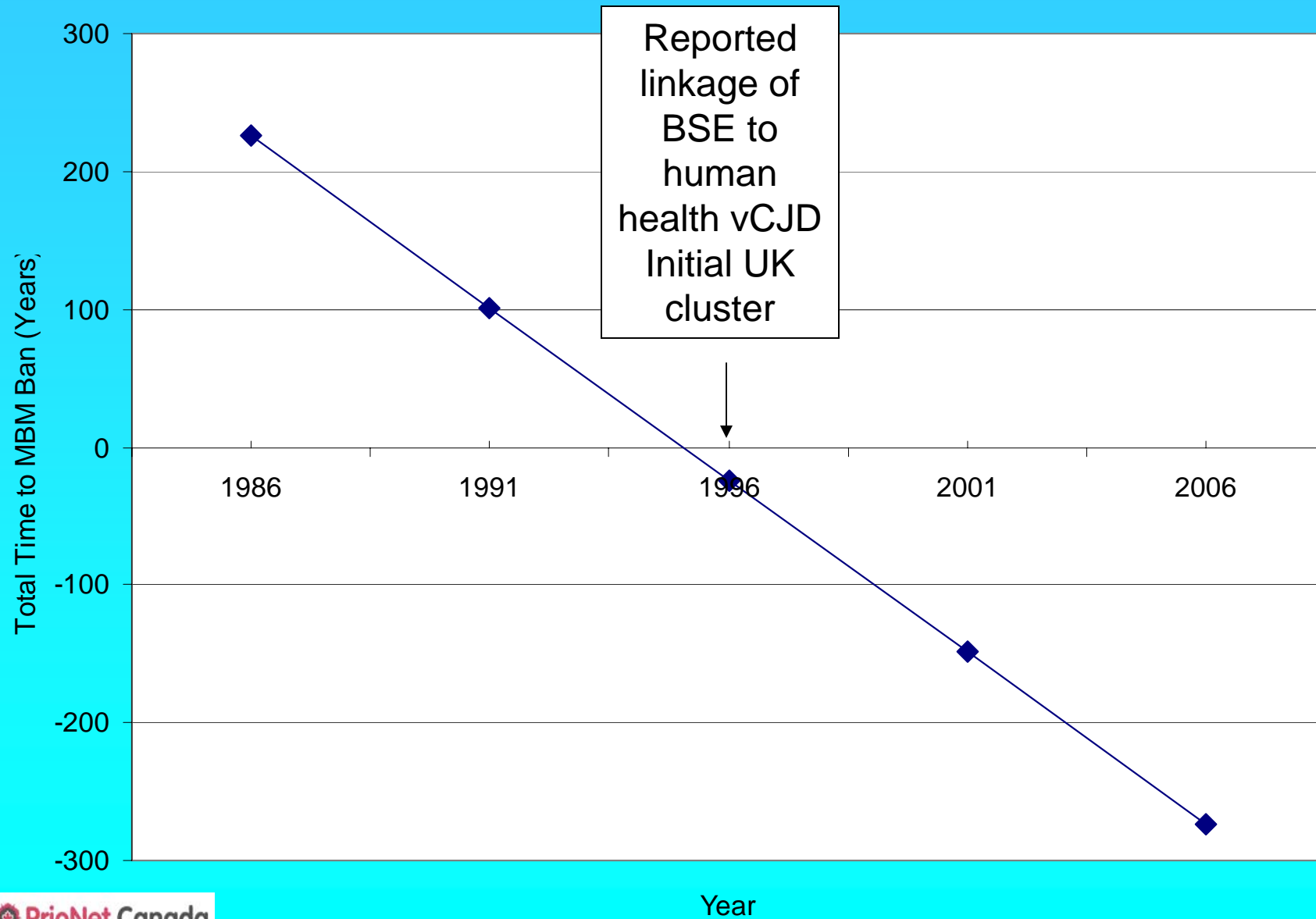
Hypothesis 5:

Awareness of vCJD and implications for human safety (1996) acted as a driver for BSE risk management and policy response.

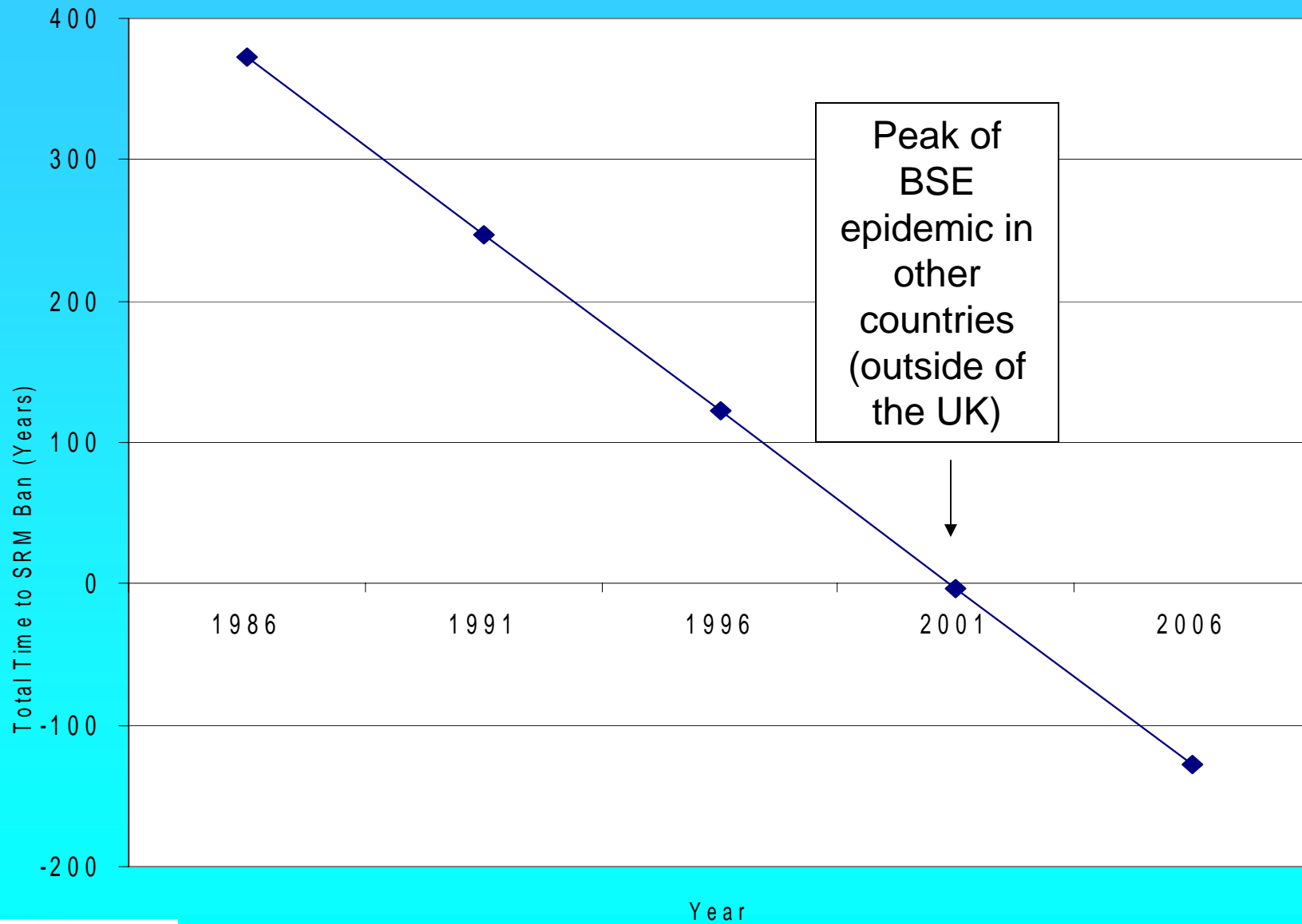
Knowledge of vCJD – Linkage to Bans



Analysis of Collective MBM Bans – Without Regard to Time Anchors: Average Time to External Challenge Reduction



Analysis of Collective SRM Bans – Without Regard to Time Anchors: Average Time to Internal Challenge Reduction



Key Lessons from Country Case Studies

- Knowledge of the UK outbreak not a significant driver for immediate BSE policy (MBM and SRM bans) in any other country that later reported BSE. The United States was the only country to respond within 3 years with a UK cattle ban.
- Policy driver to reduce external challenge (UK cattle bans, MBM bans) linked most closely with 1996 knowledge of vCJD human health linkage.
- Policy driver to reduce internal challenge (recycling/amplification SRM bans and approved rendering-disposal protocols) most closely linked to domestic BSE and the peak of non-UK BSE in 2001-2002.
- Imported BSE resulted in responses to reduce external but not internal challenge.
- Domestic BSE a signal event that induced BSE policy implementation. However, knowledge of BSE in other nearby countries was not a driver for policy.
- Non-BSE countries were not more precautionary for signal events than the worst-BSE- affected countries.