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VaxChoice Dilemma: Navigating Vaccine Hesitancy and Societal Restrictions in the Global COVID-19 Endemic Landscape

Marcello Antonini, Mesfin Genie, Arthur E. Attema, Daiga Behmane, Brian Kelly, Terje P. Hagen, Alessia Melegaro, Ana Rita Sequeira, Renu Singh, Aleksandra Torbica, Francesco Paolucci

Presenter: Francesco Paolucci

University of Newcastle (AU) & University of Bologna

Francesco.paolucci@newcastle.edu.au

Problem

- Hesitancy, reduced uptake and refusal can threaten the transition from the pandemic to the Covid-19 endemic phase and favour virus transmission and the potential emergence of new variants

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- Governments may need to rethink vaccination policies finding the optimal mix of pharmaceutical and non-pharmaceutical interventions that maximise vaccine uptake

Focus of this paper

- Elicit individual preferences and trade-offs for vaccine characteristics vis-a-vis policy restrictions

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Will investing in the development of new, more effective, vaccines suffice to boost uptake, or mandates and some forms of societal restrictions will still be needed to mitigate the impact of the virus?

Method

A multi-country Discrete Choice Experiment (DCE) tool is designed to elicit preferences of the general population:

- 36 rows D-efficient experimental design (Ngene) divided into three blocks of 12 hypothetical choice tasks

- Attributes and levels of the DCE are based on a stepwise process:

    - Review of recent literature; attribute scorecard; opportunistic think-aloud interviews

Attributes and levels

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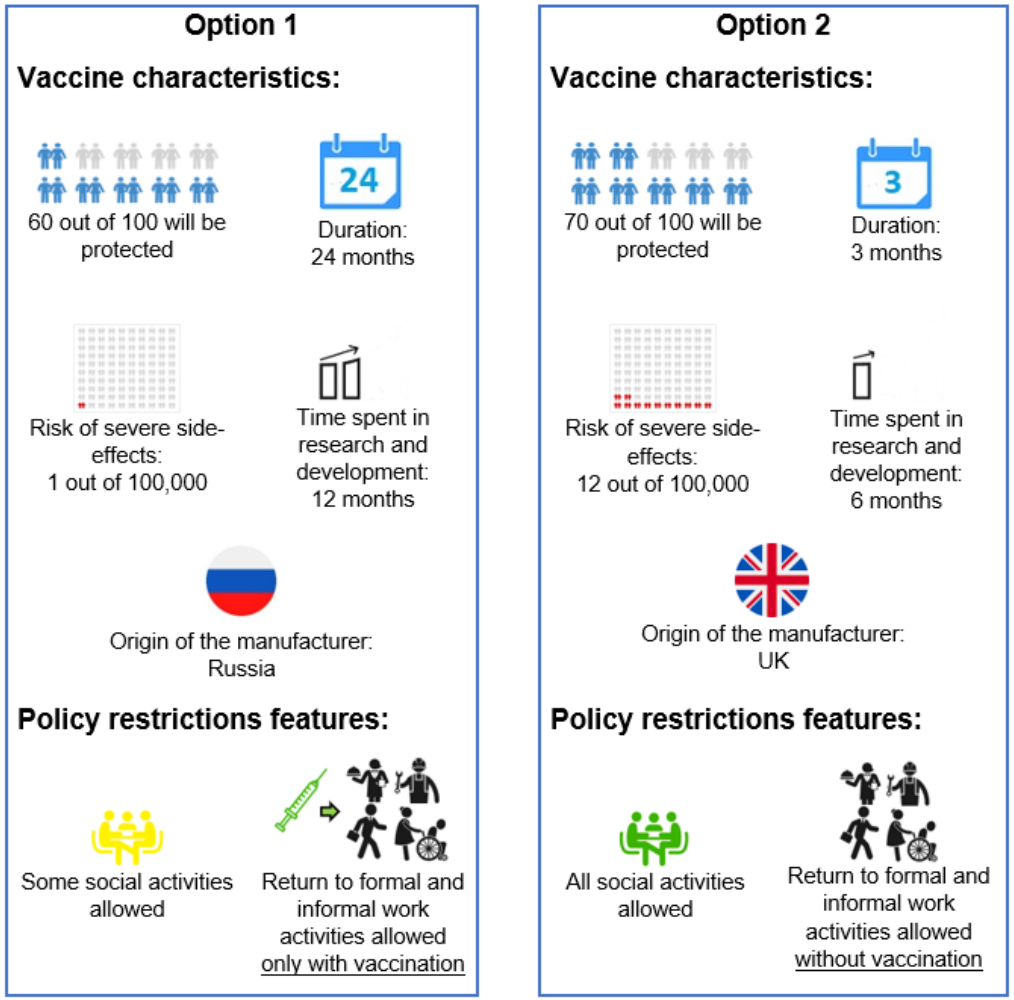
Attribute	Definition	Levels
Vaccine features		
Effectiveness in reducing severe symptom	Vaccine Effectiveness at preventing laboratory-confirmed COVID-19 severe illness (i.e., deaths, hospitalisations) in people without evidence of previous infection	40 out of 100 (40%), 60 out of 100 (60%), 70 out of 100 (70%), 90 out of 100 (90%)
Risk of severe-side effects	Probability of getting severe side-effects after the vaccination	1 out of 100,000, 5 out of 100,000, 12 out of 100,000, 20 out of 100,000
Duration of the protection	Length of time before a new vaccination is required to maintain a robust immune response	3, 6, 12, 24 months
Time between the first clinical trial to the market approval	Length of time from the experimentation of the vaccine(s) to the regulatory approval and the consequent market approval	6, 12, 24 months
The origin of the manufacturer	Country/area where the vaccine manufacturer company has its headquarter	China, European Union, Russia, UK, USA
Social restrictions features		
Stringency of the social restrictions for leisure activities	Stringency of the social activities ban	All social activities allowed, Some social activities allowed, No social activities allowed
Vaccination mandate to return to informal or informal work activities	Presence of a vaccine mandate to return to usual work activities	Return to formal and informal work activities not allowed without the vaccine, Return to formal and informal work activities allowed without the vaccine

Choice task (example)

Considering that vaccines are currently available to you, please compare the two options (Option 1 or Option 2) and then answer the two questions below by ticking the box for the option you choose



Which option would you choose?

Option 1 ☐ Option 2 ☐

Suppose you now can choose not to be vaccinated. What would you prefer?

I would still prefer to be vaccinated with the option I chose above (1 or 2) ☐

I would prefer not to be vaccinated ☐

Final questionnaire - July 2022 - March 2023

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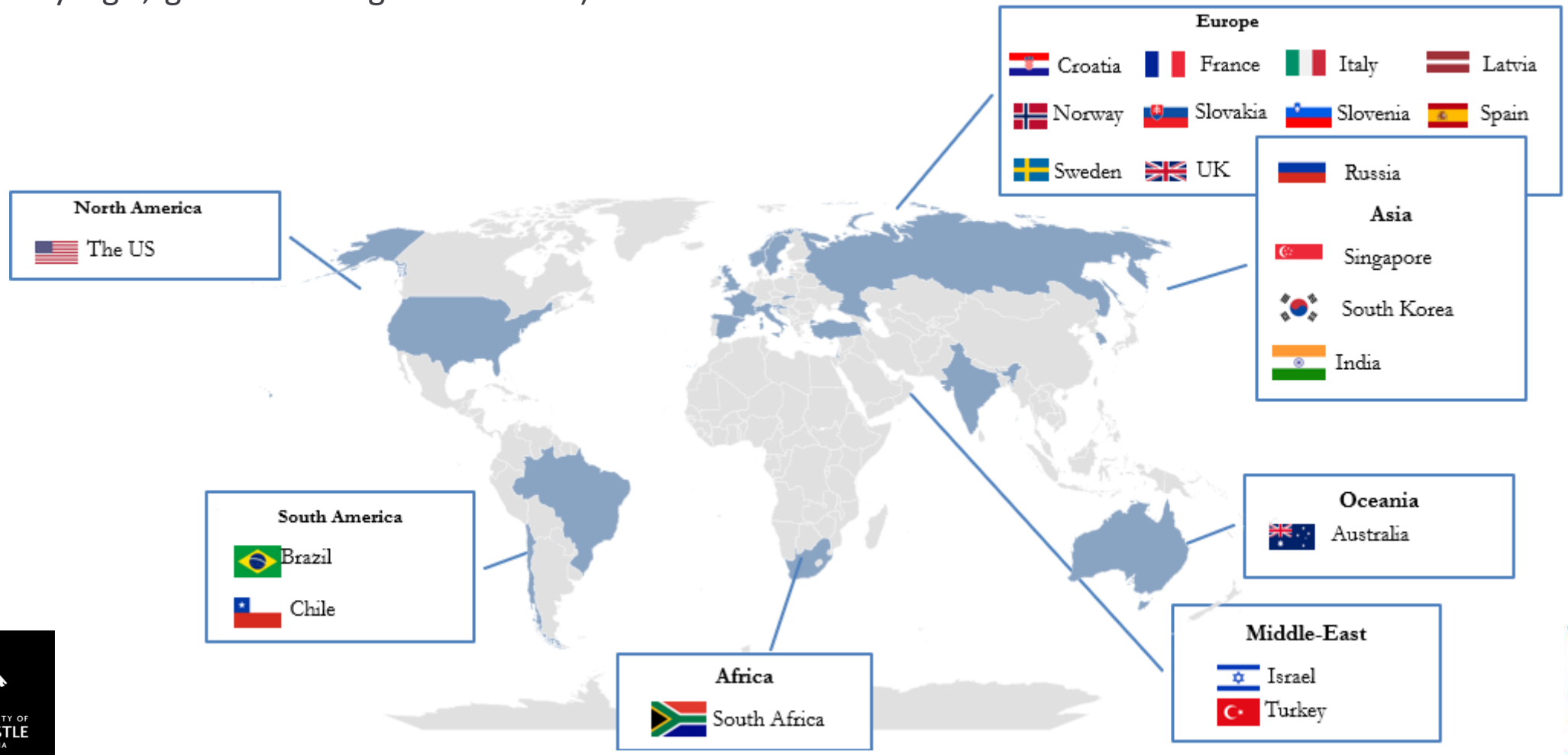
Sample size = 49,232

(stratified by age, gender and geo location)



Econometric analysis (1/2)

- To explore unobserved preference heterogeneity and account for the panel nature of the data, we used a mixed logit model (MXL)

- The utility that an individual *n* obtained from a vaccination program *j* in choice task *t* can be specified as follows:

$$U_{njt=}\beta_{0\_leftright} + \beta_1 effectiveness60 + \beta_2 effectiveness70 + \beta_3 effectiveness90 + \beta_4 risk + \beta_5 duration6 + \beta_6 duration12 + \beta_7 duration24 + \beta_8 time\ for\ market\ approval12 + \beta_9 time\ for\ market\ approval24 + \beta_{10} origin_{EU} + \beta_{11} origin_{Russia} + \beta_{12} origin_{UK} + \beta_{13} origin_{US} + \beta_{14} some\ social\ restrictions + \beta_{15} full\ social\ restrictions + \beta_{16} vaccine\ mandate + \varepsilon_{njk}$$

Econometric analysis (2/2)

- We use Marginal Rate of Substitution in the form of Willingness to Accept Risk (WTAR) as a scale free measure to make meaningful comparisons across countries.

- WTAR: how much risk (the proportion of individuals with risk of serious side effects) individuals would accept for an improvement in attribute *k*

- We estimated the parameters in WTAR space (Train & Weeks, 2005)

$$U_{njt=} - \lambda_n r_{njt} + (\lambda_n \omega_n)' x_{njt} + \varepsilon_{njt}$$

Interactions

- To explain part of the observable heterogeneity, we extend this model by interacting the socioeconomic variables with the mean of the estimated WTAR values for each attribute.

- The interaction coefficients indicate the difference in WTAR, relative to the sample average, for those respondents with a certain characteristic (e.g., female, above age of 45, high income, etc.).

Results

Descriptive statistics

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Country	Respondents (N)	Median Age*	Female (%)	Bachelor and over (%)	High income** (%)	Living in urban area (>50,000 inhabitants) (%)	Married (%)	Outright refusers (%)
Australia	3,004	45	51.0	39.9	20.2	51.9	57.5	4.8
Brazil	3,001	40	51.8	45.8	48.6	66.8	59.2	1.5
Croatia	1,062	49	51.1	45.0	18.7	41.0	57.6	17.4
France	3,165	48	52.2	23.1	17.2	24.2	59.4	8.0
India	3,128	36	48.8	81.8	37.5	64.3	68.5	0.3
Israel	1,513	40	50.2	52.3	12.3	47.3	55.9	0.0
Italy	3,001	51	51.7	36.4	18.6	42.9	63.6	4.1
Russia	3,010	46	54.5	63.8	22.1	79.6	62.6	18.1
South Africa	3,002	36	51.9	41.9	63.6	56.9	46.2	12.0
South Korea	3,000	49	50.0	70.9	32.5	77.7	57.9	2.3
UK	3,115	47	51.2	34.6	9.6	30.2	55.3	5.7
USA	3,158	45	51.4	48.2	12.3	37.4	54.7	11.8
Total	49,232	45	51.2	50.1	27.5	52.4	58.3	6.8

Western countries

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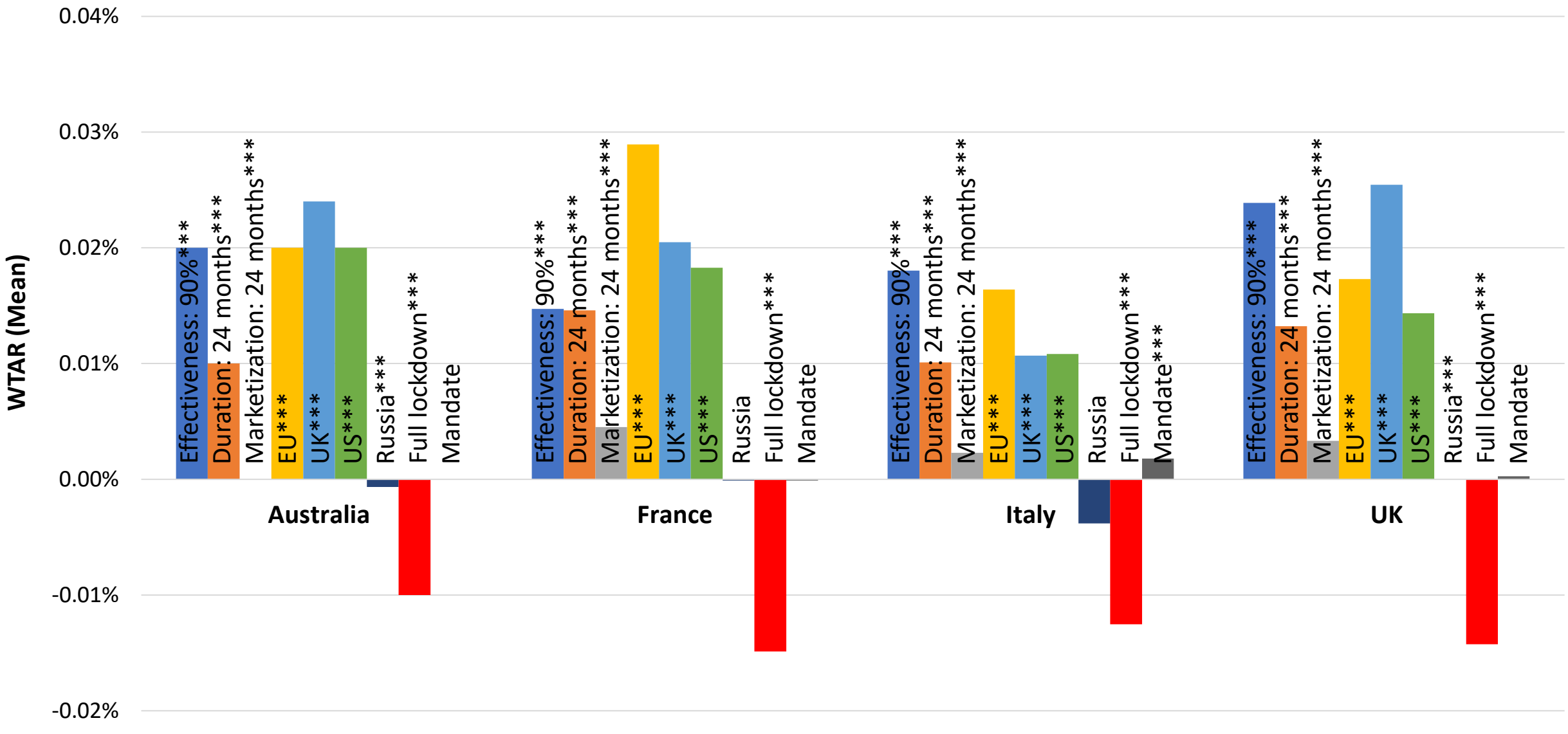

Other countries

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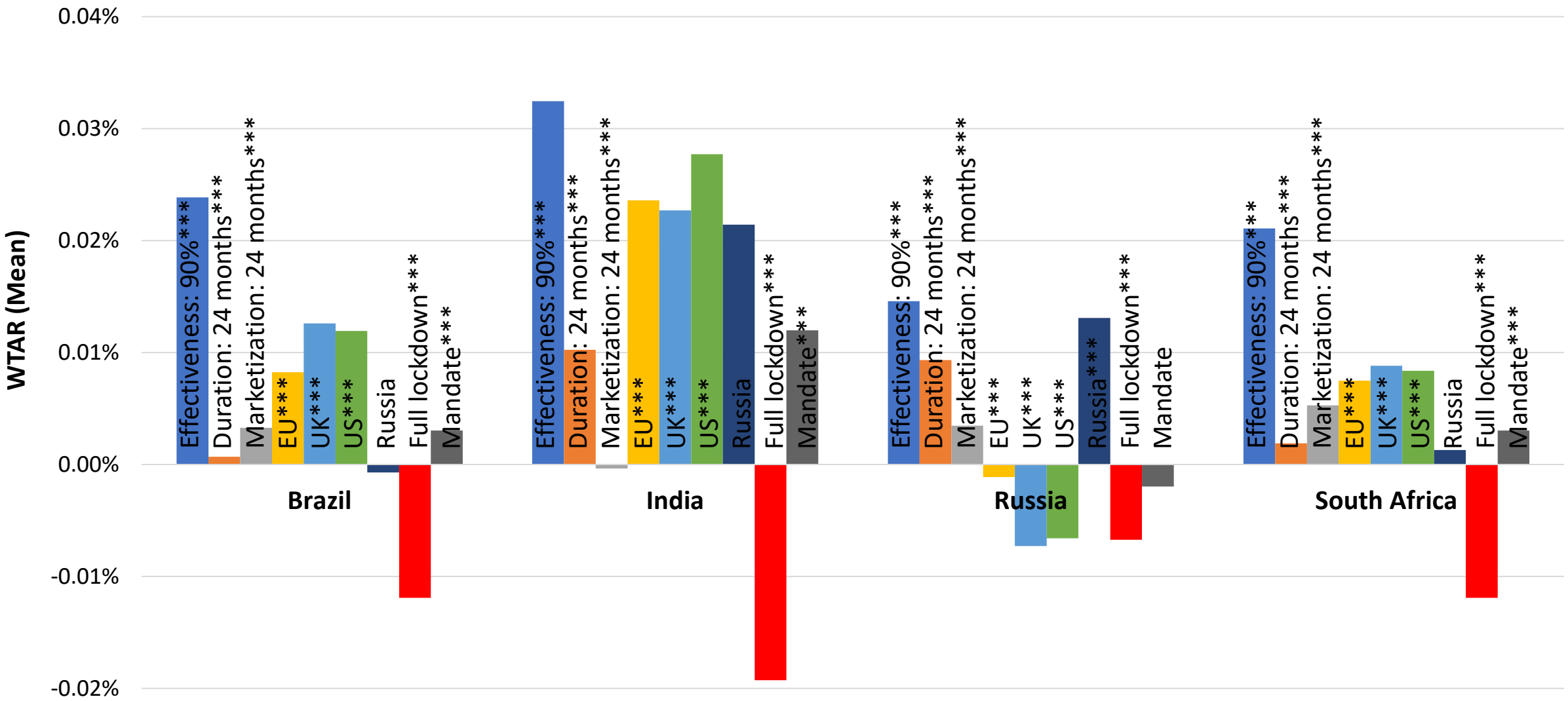

Western countries

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	AUSTRALIA								FRANCE							
	Means	Age	Female	Bachelor	Urban	Children	High income	Death relative	Means	Age	Female	Bachelor	Urban	Children	High income	Death relative
Effect90	21.9***	5.89***	-	3.3*	8.5***	-	-12.5***	-11.1***	10.8***	8.5***	-	-	-	-	-	-
Duration24	8.5***	4***	-	-	4.2***	-	-3.8**	-6.6***	10.1***	-	3.0**	-	-	3.7***	-3.3*	-6.3***
Marketization24	6.6***	-3.8***	2.5**	-	-	-	-3.6**	-	-	-	4.0***	5.1***	-	-	-5.1***	-3.6*
EU	7.9***	13.4***	4.6***	6.0***	5.0***	-	-4.5**	-10.0***	17.8***	13.4***	-	11.4***	-	7.0***	-	-12.2***
UK	13.9***	13.5***	-	4.3**	2.9*	-	-4.7*	-13.1***	8.9***	12.0***	-	5.6**	-	5.3***	4.2*	-6.8***
US	14.4***	12.6***	-	-	4.9***	-	-5.5**	-13.0***	5.9**	14.6***	-	11.0***	-	5.2***	-	-8.1***
Russia	5.3**	-	3.3**	-	-	-	-	-8.3***	-	-	3.0*	-	-	-	-	-
Lockdown	-16.5	3.0**	-	4.1***	-	-	-	-	-10.1***	-	-2.9**	-	-	-4.7***	-3.5*	-
Mandate	-	2.9***	-	-	-1.8**	-	-	2.7*	-	-	-	-	-	-	-	-
	ITALY								**UK**							
Effect90	17.4***	-	-1.6*	1.8*	-	-	2.6**	-	21.2***	4.3**	-2.7*	3.8**	-	-	-	-
Duration24	11.5***	-	-	-	-	-	-	-	10.2***	5.1***	3.3***	-	-	-	-5.1**	-
Marketization24	-	-	1.2*	-	-	-	-	-	-	2.2*	4.4***	-	-	-	-4.2**	-
EU	16.7***	2.5**	-2.5***	-	3.97***	-	-	-2.0*	14.7***	11.7***	-	3.4**	-	-4.9***	-	-
UK	11.6***	2.2**	-	-	-	-	-	-2.1*	20.8***	11.8***	-	-	-	-	-	-
US	9.9***	3.0***	-1.9**	-	2.65***	-	-	-	9.9***	13.9***	-	3.1*	-	-5.3***	-	-
Russia	-	-	-	-	-	-	-	-	-4.1*	-	-	-	-	-	-	-
Lockdown	-16.2***	5.7***	-	-	-	-	-	-	-16.2***	-	-5.9***	2.3*	-	2.4*	-	5.0***
Mandate	-	-	0.9*	-	0.92*	-	-	-	-	-	1.3*	-	-	-	3.8***	-

Other countries

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	BRAZIL								INDIA							
	Means	Age	Female	Bachelor	Urban	Children	High income	Death relative	Means	Age	Female	Bachelor	Urban	Children	High income	Death relative
Effect90	25.9***	-	-4.9***	6.3***	-	-	-3.8*	-	46.3***	-	-16.1***	-	-	-	-	-8.4**
Duration24	3.6**	-	2.3*	3.3**	4.0***	2.48*	-	-	-	10.8***	-	6.33*	-	-	-	-
Marketization24	3.7*	-	-	-	-	-	-	-	-	-	9.5***	-	-5.9*	-	-	-
EU	8.9***	-	-3.7**	-	-	-	-	-	-	10.4**	-6.6*	-	11.1***	6.8*	-	-
UK	8.7***	-	-	-	3.3*	-	-	-	-	14.8***	-	-	11.3**	-	10.6***	-
US	13.1***	-	-3.8**	-	-	-	-	-3.5*	-	16.6***	-6.1*	-	7.8*	10.2**	7.5*	-
Russia	-4.9*	-	-	-	5.0**	-	-	-	-	16.7***	-	-	12.9***	-	-	-
Lockdown	-20.2***	2.7*	-	-5.5***	-	3.27**	-	4.4***	-23.0***	-	-	-	-	-	-	-
Mandate	3.5**	3.0***	5.5***	-	-2.7**	-	-	2.4**	13.5***	-	7.7***	-	-	-	-5.2**	-
	RUSSIA								**SOUTH AFRICA**							
Effect90	21.2***	4.3**	-2.7*	3.8**	-	-	-	-	15.5***	-	-	-	5.2***	-	6.2***	-
Duration24	10.2***	5.1***	3.3***	-	-	-	-5.1**	-	4.2***	4.3***	-	-	1.8*	-	4.9***	-
Marketization24	-	2.2*	4.4***	-	-	-	-4.2**	-	3.1*	-	2.6**	-	-	-2.74**	2.9**	-
EU	14.7***	11.7***	-	3.4**	-	-4.9***	-	-	-	10.7***	-	-	-	-	4.2***	-
UK	20.8***	11.8***	-	-	-	-	-	-	-	11.7***	-	-	-	-	2.9*	-
US	9.9***	13.9***	-	3.1*	-	-5.3***	-	-	-	8.9***	-	-	-	-	3.4**	-
Russia	-4.1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4*
Lockdown	-16.2***	-	-5.9***	2.3*	-	2.4*	-	5.0***	-13.6***	-	2.8**	-	-2.7**	-	-	-
Mandate	-	-	1.3*	-	-	-	3.8***	-	2.9**	-	2.1**	-	-	-	-2.7***	-

Key findings (so far)

- Governments should cooperate to finance research and the development of more effective vaccines that yield longer protection.
- To counteract the effects of ‘medical nationalism’, governments should strive to strengthen the role of international bodies such as the WHO
- Tailored restrictions may be applied to various population subgroups to maximize adherence to policies and avoid the imposition of lockdowns.
- The ethical justification and necessity of a mandate may vary depending on the national context, but it can help make COVID-19 vaccination a routine practice

THANK YOU!

Presenter: Francesco Paolucci
University of Newcastle (AU) & University of Bologna
Francesco.paolucci@newcastle.edu.au