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# From Local Policies to Global Impact : Tailored Urban Strategies Toward Sustainability

Charlotte Liotta

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Submitted on 10 Oct 2024

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# SOUTENANCE DE THÈSE DE DOCTORAT

## Procès-verbal

### DOCUMENTS À SIGNER À L'ISSUE DE LA SOUTENANCE (Arrêté du 25 mai 2016)

**Les documents suivants doivent impérativement être signés à l'issue de la soutenance :**

1. La liste d'émargement des membres du jury, indiquant les noms et fonctions de chaque membre ;
2. La décision du jury relative à l'obtention du diplôme de docteur, uniquement signée par le Président ou la Présidente du jury ;
3. Le rapport de soutenance (sans référence à la décision du jury), signé par tous les membres du jury, y compris le directeur ou la directrice de thèse (et le co-directeur ou la co-directrice de thèse) ;
4. L'avis du jury sur la reproduction de la thèse soutenue ;
5. L'autorisation du doctorant pour la diffusion en ligne de la thèse soutenue, au-delà de la communauté universitaire.

**En application de l'article L612-7 du code de l'éducation**, les établissements d'enseignement supérieur et de recherche mettent en œuvre, dans le cadre des soutenances de leurs doctorantes et doctorants, **une prestation de serment d'intégrité scientifique**. Cette disposition est inscrite dans l'article 19bis de l'arrêté de la formation doctorale (évolution introduite par l'arrêté du 26 août 2022 modifiant l'arrêté du 25 mai 2016).

Il est rappelé que l'établissement délivre le titre de docteur sans mention ni félicitations du jury.

**Tous les documents originaux doivent revenir signés à l'École Doctorale ; ils sont obligatoires pour la délivrance du diplôme.**

#### **Peuvent être Président ou Présidente du jury :**

- les professeurs ou professeures d'université,
- les enseignants ou enseignantes et chercheurs ou chercheuses assimilé(e)s aux professeurs et professeures d'université au sens de l'article 1er de l'arrêté du 15 juin 1992, c'est-à-dire notamment :
  - les professeur(e)s du Collège de France, du Muséum national d'histoire naturelle, du Conservatoire national des arts et métiers, de l'École des hautes études en sciences sociales, de l'École pratique des hautes études en sciences sociales, des écoles normales supérieures et de l'École centrale des arts et manufactures,
  - les directeurs de recherche des établissements publics à caractère scientifique et technique (EPST), dont le CNRS, l'INRA, l'INSERM, l'IRD, l'INRIA, l'IRSTEA et l'INED,
- les enseignants et enseignantes ou les chercheurs et chercheuses de rang équivalent qui ne dépendent pas du ministère de l'éducation nationale, c'est-à-dire notamment les professeurs et professeures en titre de l'École nationale des ponts et chaussées, ainsi que celles et ceux d'établissements sous tutelle d'autres institutions ou ministères (agriculture, culture, environnement, santé, etc.), en France ou à l'étranger.
- Les deux rapporteurs ou rapporteuses ne sont pas membres de l'école doctorale ni de l'établissement d'inscription du doctorant ou de la doctorante (art. 17).

**NB : Le directeur, le co-directeur, la directrice ou la co-directrice de thèse, ne peuvent en aucun cas être président ou présidente du jury.**



École des Ponts  
ParisTech



Ville, Transports  
et Territoires

# RAPPORT DE SOUTENANCE

Procès-verbal



## LISTE D'ÉMARGEMENT DES MEMBRES DU JURY

Date de la soutenance : 12 mars 2024

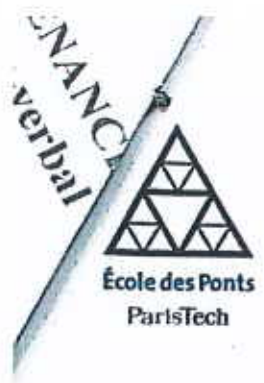
Candidate : Madame Charlotte LIOTTA

Née le 14 avril 1999 à COULOMMIERS (France)

Doctorat : Sciences économiques

Titre de la thèse : Politiques locales, impact mondial: mettre en place des politiques urbaines adaptées pour des villes plus durables

MEMBRES DU JURY	NOM - PRÉNOM	SIGNATURE
Le Président / La Présidente	<i>YR Caruso</i>	
Les rapporteurs / Les rapporteuses.	- M. Geoffrey CARUSO - Mme Sandrine MATHY - Mme Gesa GEISLER	<i>[Signature]</i> Plo S. Mathy Plo G. Geisler
Les examinateurs / Les examinatrices	- M. Louis-Gaëtan GIRAUDET - Mme Xuemei BAI	<i>[Signature]</i> Plo X. Bai
Le directeur de thèse / La directrice de thèse	- M. Vincent VIGUIE - M. Felix CREUTZIG	<i>[Signature]</i>



# RAPPORT DE SOUTENANCE

## Procès-verbal

### DÉCISION DU JURY

À l'issue de la soutenance, par décision des membres du jury à laquelle n'a pas pris part le directeur ou la directrice de thèse (non plus que le co-directeur ou la co-directrice et le co-encadrant ou la co-encadrante, le cas échéant) (article 18, arrêté du 25 mai 2016),

**Madame Charlotte LIOTTA**

Unité de recherche : CIRED - Centre International de Recherche sur l'Environnement et le Développement

Ecole doctorale : VTT (Ville, Transports et Territoires)

A été élevée au grade de docteur de l'École nationale des ponts et chaussées

A été ajournée

(COCHER LES CASES APPROPRIÉES ET RAYER LES MENTIONS INUTILES)

Après avoir prononcé la décision d'admission, le président de jury invite le docteur à prêter serment :

"En présence de mes pairs.

Parvenue à l'issue de mon doctorat en 'Sciences économiques', et ayant ainsi pratiqué, dans ma quête du savoir, l'exercice d'une recherche scientifique exigeante, en cultivant la rigueur intellectuelle, la réflexivité éthique et dans le respect des principes de l'intégrité scientifique, je m'engage, pour ce qui dépendra de moi, dans la suite de ma carrière professionnelle quel qu'en soit le secteur ou le domaine d'activité, à maintenir une conduite intègre dans mon rapport au savoir, mes méthodes et mes résultats."

"In the presence of my peers.

With the completion of my doctorate in 'Sciences économiques', in my quest for knowledge, I have carried out demanding research, demonstrated intellectual rigour, ethical reflection, and respect for the principles of research integrity. As I pursue my professional career, whatever my chosen field, I pledge, to the greatest of my ability, to continue to maintain integrity in my relationship to knowledge, in my methods and in my results."

A l'issue de la soutenance Madame LIOTTA Charlotte a prêté serment :  Oui  Non

Fait à Nogent sur Seine - Maine le 12 mars 2024

Le Président ou la Présidente du jury,

Signature

G. CHUSP



AVIS DU JURY  
SUR LA REPRODUCTION DE LA THÈSE SOUTENUE

**Titre de la thèse :** « Politiques locales, impact mondial: mettre en place des politiques urbaines adaptées pour des villes plus durables »

**Autrice :** Madame Charlotte LIOTTA

**Membres du jury :** M. Vincent VIGUIE, M. Felix CREUTZIG, M. Louis-Gaëtan GIRAUDET, Mme Xuemei BAI, M. Geoffrey CARUSO, Mme Sandrine MATHY, Mme Gesa GEISSLER,

**Le Président ou la Présidente du jury :**

**Date de la soutenance :** 12 mars 2024

**Reproduction de la thèse soutenue (cocher la case correspondante) :**

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**N.B. :** Il est recommandé de bien préciser au candidat les corrections qu'il doit apporter à sa thèse et dans un délai qui est réglementairement fixé à 3 mois.

L'attestation de diplôme ne lui sera remise que dans la mesure où le Président ou la Présidente du jury aura constaté que ces corrections ont été effectuées et que l'École Doctorale en aura été informée.

**Niveau de confidentialité de la Thèse**

**Thèse confidentielle :**  OUI  NON Date de fin de confidentialité : .....

**Embargo sur la diffusion :**  OUI  NON Date de fin de l'embargo : .....  
(durée de l'embargo limitée à 5 ans, avec prolongation possible, sur demande motivée et justifiée de l'auteur à fournir au plus tôt un an après la soutenance)

Fait à Nogent-sur-Meuse, le 12 mars 2024.....

Le Président ou la Présidente du jury,

Signature

G. CARUSO





**AUTORISATION DU DOCTORANT POUR  
LA DIFFUSION ÉLECTRONIQUE DE LA THÈSE SOUTENUE**

Je soussignée Madame Charlotte LIOTTA

**Titre de la thèse :** « Politiques locales, impact mondial: mettre en place des politiques urbaines adaptées pour des villes plus durables »

Conformément aux règles de diffusion des thèses de l'École nationale des ponts et chaussées telles qu'explicitées dans la Charte du doctorat :

autorise la diffusion en ligne de ma thèse au-delà de la communauté universitaire, selon les dispositions prévues par cette charte

immédiatement / après un embargo de :  6 mois  1 an

n'autorise pas la diffusion en ligne de ma thèse au-delà de la communauté universitaire.

Je certifie que :

la version électronique de la thèse déposée est conforme à la version imprimée remise aux membres du jury

je dispose de toutes les autorisations pour reproduire dans ma thèse les éventuels extraits d'œuvres, les images, etc. dont je ne serais pas l'auteur.

si je n'ai pas obtenu certaines de ces autorisations, j'ai déposé une version partielle de ma thèse, amputée des parties qui posent problème, qui sera diffusée, alors que la thèse complète sera archivée sans être diffusée.

(Cocher les cases appropriées et rayer les mentions inutiles)

Fait à Paris, le 1/4/2024

Signature



## AUTHORIZATION LETTER JURY MEMBERS IN VIDEOCONFÉRENCE

I, Gesa Geißler  
(member of the jury)

Name : Gesa  
Surname : Geissler

**Authorize the President of the jury to sign in my name the following documents:**

- Thesis defence report of the jury

Name and Surname of the PhD student: Charlotte Liotta

Date of the defence: 12.03.2024

Thesis supervisor: Felix Creutzig, Vincent Viguie

Email of the thesis supervisor: creutzig@mcc-berlin.net, viguie.cired@gmail.com

Done at (location): Paris

Date : 11.03.2024

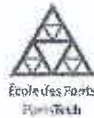
Signature of the jury member : 

**This authorization must be transmitted to the thesis supervisor before the defence.**

To be filled in after the defence :

Name, Surname and Signature of the Président of the jury: CARLOS GEORGET





**AUTHORIZATION LETTER  
JURY MEMBERS IN VIDEOCONFÉRENCE**

I, Sandrine THATY, member of the jury  
(member of the jury)

Name :

Surname :

**Authorize the President of the jury to sign in my name the following documents:**

- Thesis defence report of the jury

Name and Surname of the PhD student: LORTA Charlotte

Date of the defence: 12/3/2024

Thesis supervisor: Vincent VIGUIE and Felix CREUTZIG

Email of the thesis supervisor: vigue.viced@gmail.com

Done at (location): CIREP / ENPC

Date: 11/03/2024

Signature of the jury member :

**This authorization must be transmitted to the thesis supervisor before the defence.**

To be filled in after the defence :

Name, Surname and Signature of the Président of the jury: CARLOS GEOFFREY





English Version below

## PROCURATION MEMBRE DU JURY EN VISIOCONFÉRENCE

Je soussigné(e) .....  
(membre du jury en visioconférence)

Nom : **BAI**

Prénom : **Xuemei**

Donne procuration au Président du jury pour signer en mon nom les documents de soutenance :

- le procès-verbal de soutenance

Nom et prénom du doctorant : **Charlotte LIOTTA**

Date de soutenance : **12 mars 2024**

Directeur de thèse : **Vincent VIGUIE - Felix CREUTZIG**

Email du directeur de thèse : **viguie.cired@gmail.com - creutzig@mcc-berlin.net**

À .....

Le **06/04.2024**

Signature du membre du jury en visioconférence

Cette procuration doit obligatoirement être transmise au directeur de thèse avant la soutenance.

À compléter après la soutenance :

Nom et prénom du président du jury et signature.....






Mardi 12th, 2023

Evaluation of the thesis  
of Charlotte Liotta, born 14. April 1999.

Written thesis: Very good

Verbal thesis: Very good

Total grade: Magna cum Laude.

Name	Signature
Felix Creutzig	
Vincent Vignic	
Louis-Guëtan Grandet	
CARUSO GEOFFREY	
P./o   G. GEISLER S. MATRY H. BOE	



# RAPPORT DE SOUTENANCE

## Procès-verbal




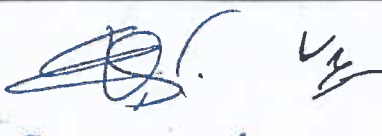
### RAPPORT DE SOUTENANCE ÉCRIT (sans référence à la décision du jury)


Voir rapport détaillé ci-joint.

À Nogent-sur-Seine, le ... 12 ... mois ... 2011

Les Membres du Jury (y compris le directeur ou la directrice et/ou le co-directeur ou la co-directrice de thèse, le co-encadrant ou la co-encadrante)

  
Plo S. MATHY

  
Plo G. GEIGER

  
Plo X. BOIS

Le Président ou la Présidente du jury



## **Report on the Ph.D. defense of Charlotte Liotta**

*March 12th, at CIREA, 45bis avenue de la Belle Gabrielle, Nogent-sur-Marne*

Ph.D. title: "From Local Policies to Global Impact: Tailored Urban Strategies Toward Sustainability"

### **Jury members:**

- Sandrine MATHY - Rapporteur
- Gesa GEISSLER - Rapporteur
- Geoffrey CARUSO - Rapporteur
- Louis-Gaëtan GIRAUDET - Examiner
- Xuemei BAI - Examiner
- Felix CREUTZIG - Ph.D. supervisor
- Vincent VIGUIE - Ph.D. supervisor

### **Beginning of the session**

The defense starts at 9.30 am. The jury chooses Geoffrey CARUSO as its chair. Geoffrey CARUSO and Vincent VIGUIE present the jury members to the audience. Then, Geoffrey CARUSO asks Charlotte LIOTTA to present her thesis in 30 mn.

### **Charlotte LIOTTA's presentation**

Charlotte LIOTTA presents her thesis.

She starts by introducing the motivations, research question, and outline of the thesis. Then, she presents part I of the thesis, which aims to apply a model derived from the Standard Urban Model of urban economics to a sample of 120 cities on 4 continents to model the efficiency and welfare impacts of 4 urban transport mitigation policies. Charlotte LIOTTA details the data collection, the model validation, the policy scenarios, and the results. Then, she moves to part II of the thesis, which includes three case studies on the distributional impacts of urban transport mitigation policies: low-emission zones in 8 French cities, a fuel tax in Cape Town, and public transport development in Paris.

Then, Geoffrey CARUSO gives the floor to each jury member to ask questions, starting with Sandrine MATHY.

### **Sandrine MATHY's questions**

Sandrine MATHY congratulates Charlotte LIOTTA for the quality of the manuscript, which is very well written and contains useful information and analyses in the appendices. Sandrine MATHY notes that Charlotte LIOTTA made the effort to write a consistent manuscript linking chapters together instead of just compiling her different papers. She also emphasizes that the manuscript provides very good analyses and discussion of each result. Finally, she congratulates Charlotte LIOTTA for her high number of top-notch publications within a short timeframe, in various fields, derived from the thesis.

Then, Sandrine MATHY asks questions about Chapters 2, 3, and 4 of the thesis:



- **Chapter 2** develops a nice database and gathers an impressive amount of data for about 200 cities. Sandrine MATHY underlines that gathering data on transportation and real estate is difficult, that the methods and choices seem very rigorous, and that the database will be very useful for the research community.
  - Question 1: Why do you take cities above 300,000 inhabitants? Plus, there are more than 200 cities within this limit, especially in China. Why do you leave them out?
  - Question 2: How are the city boundaries defined? How does it relate to the French “agglomeration”?
  - Question 3: It would have been nice to have more descriptive statistics on all cities in the manuscript.
  - Question 4: The manuscript mentions that city centers are defined as a compromise between 5 criteria; Sandrine MATHY asks for more details about this “compromise”.
  - Question 5: Are regular updates of the database planned?
- Regarding **Chapter 3**, Sandrine MATHY has two questions:
  - Question 6: Why do you find it “surprising” that the model is found to be valid for most cities of the sample?
  - Question 7: Would a more robust “regulatory environment” index have led to significant results in the regressions?
- Sandrine MATHY emphasizes that the results of **Chapter 4** are impressive.
  - Question 8: Her main question on this chapter is that a monocentric model is relevant to understand city structures, as detailed in Chapter 3, but less relevant for GHG emissions. In particular, transportation choices do not depend only on transport times and costs. They also depend on the sequence of activities carried out on the commuting route. This questions the validity of the results.

Charlotte LIOTTA answers this first series of questions.

Then, Sandrine MATHY asks questions about Chapters 5, 6, and 7 of the thesis: She starts by emphasizing that a section on inequalities is important and policy-relevant.

- **Chapter 5:**
  - Question 9: Why are extrapolations used to recover data on polluting vehicle ownership? Aren't the data available in transportation surveys?
  - Question 10: In your accessibility model, you assume that a worker of a given occupational category could find a job in any other profession within this category. This hypothesis may hold better for low-skilled workers than for white-collar workers. You could maybe use a more disaggregated skill grid?
  - Question 11: Did you consider cycling as an alternative?
  - Question 12: How do you account for households with more than one car?

- **Chapter 6**, analyzing the potential impacts of fuel taxes in Cape Town, has two main results. First, it is more relevant to tax only private vehicles than to tax all polluting vehicles; and second, residential relocation has limited potential.
  - Question 13: Could a policy bringing jobs to people be implemented instead?
  - Question 14: What would be the impact of redistributing the tax?
- **Chapter 7**:
  - Question 15: Same question as for Chapter 5 - you assume that a worker of a given occupational category could find a job in any other profession within this category.
  - Question 16: Much data is not available, notably on congestion and on the developments of buses, limiting the relevance of the conclusions of the chapter.
- Final comments:
  - Question 17: We have to wait for page 155 to have the word “bicycle”: why don't you account more for cycling as a solution for mobility?
  - Question 18: You account for accessibility based on objective parameters related to distance, employment, etc. But there is also perceived accessibility and socio-spatial representations of accessibility. It would have been interesting to mention these aspects in your introduction.
  - Question 19: What would be your policy recommendation to limit the impact on more vulnerable populations?

Charlotte LIOTTA answers the second set of questions.

### **Gesa GEISLER's questions**

Gesa GEISLER starts by saying that she learned a lot by reading the manuscript and that the topic is relevant. She notes that the presentation was well done, summarizing interesting results, and congratulates Charlotte LIOTTA for the quality of the PhD.

She asks a set of questions, which Charlotte LIOTTA answers as she goes along:

- Question 1: What is the narrative for the choice of the case studies (from Chapters 5 to 7)? Can you generalize from those case studies? How would you adapt the findings to other contexts, such as Low Emission Zones in Germany?
- Question 2: This question and the following are on Chapter 5. How could you use your model in decision-making? How would you evaluate the use of these approaches, would you say that it's directly applicable?
- Question 3: What are the uncertainties you found in your model? How could you monitor your approach?
- Question 4: How would you improve your models? In particular, the manuscript mentions that further research could model public support, how would you do so?
- Question 5: You mention that AI could be used to improve modeling. In which specific way?

### **Geoffrey CARUSO's questions**

Geoffrey CARUSO congratulates Charlotte LIOTTA for her very well-written Ph.D. The whole story is very convincing, Part I and Part II flow well together, the publication outcome is impressive, and there is a good balance between models and critical approaches. It is great to have urban economics models upscaled.

He then asks a set of questions, which Charlotte LIOTTA answers as he goes along:

- **Question 1:** Do you consider production or consumption-based emission data? How do you disentangle them both? What are the implications for the validation of Chapter 4?
- **Question 2:** The manuscript doesn't talk about generalization, preferring the term "upscaling". Still, it would be useful for policymakers to get some general results from the thesis.
- **Question 3:** How do you compute and aggregate the data on price per m<sup>2</sup>?
- **Question 4:** Why do you mention polycentricity as an idea for further research, since you show in Chapter 3 that the monocentricity hypothesis holds well?
- **Question 5:** It is surprising to see that different studies with very different methods have the same result in terms of potential emissions mitigation from cities. Is it because of inertia? How much can we transform the current housing stock? In all these models, do we measure what is actually happening, or do we only observe the fact that things don't change so much in the end? Would you recommend wiping out entire neighborhoods and starting over from scratch?
- **Question 6:** How is the tax redistributed in Chapter 6? What would you do with this money? Would you recommend that the revenues of the taxes feed the housing market?

### **Louis-Gaëtan GIRAUDET's questions**

Louis-Gaëtan GIRAUDET starts by congratulating Charlotte LIOTTA for her thesis: it is well written and led to an outstanding publication output. There is a nice blend of data/models/policy analysis, a combination of systematic analyses and case studies, a joint focus on efficiency and equity, and a nice blend of static and dynamic analyses.

Louis-Gaëtan GIRAUDET starts with a few remarks, without asking for an answer from Charlotte LIOTTA:

- Reading the manuscript, he has the same question as Sandrine MATHY: why is it so "surprising" that the monocentric model performs so well?
- In Chapter 4, the impact of the combination of the 4 policies does not correspond to the sum of the impact of the 4 policies separately. Is it because of potential interactions between the policies?
- In Chapters 5 and 7, he has the same remarks as Sandrine MATHY regarding the matching between workers and jobs in the accessibility model: is there a proper job market with explicit supply and demand, differentiated by skill level?.
- In Chapter 6, it would have been interesting to investigate more revenue recycling options.

Then, Louis-Gaëtan GIRAUDET asks a few questions, which Charlotte answers as he goes along:

- Question 1: What can be said about the *Grand Paris Express* from the results of Chapter 7?
- Question 2: The focus of the thesis is on within-city inequality. Do you have anything to say about between-city inequality? That could include other effects, such as inter-city competition on the one hand (e.g., think of the aftermath of Brexit), peer effects on the other (e.g., are Low-emission zones emulated?)...
- Question 3: Do you have anything to say about climate change adaptation? You use the word “adaptation” in the context of the “adaptation to policies”, which is perhaps not the best use of the word “adaptation”.
- Question 4: You allude a lot to local policies that get public support, but LEZs, for instance, are implemented locally but decided at the national level. What is the most appropriate governance level? How do you solve this conundrum between top-down decisions and local implementation?
- Question 5: What is the main takeaway of your thesis? Your research question is more methodology-oriented, but what is conceptual here? You have a clear quantitative result, but what would be the main takeaway except for quantitative insights?

### **Xuemei BAI's questions**

Xuemei BAI starts by congratulating Charlotte LIOTTA for her excellent thesis, successful presentation, and outstanding publication outcome, addressing a very important topic. The overall research design is well structured.

She asks a set of questions, which Charlotte LIOTTA answers as she goes along:

- Question 1: Data quality can be a limiting factor. How do you assess it, and would you have an example?
- Question 2: It is unclear whether Part II of the thesis uses the data collected in Part I or different datasets.
- Question 3: How do you relate the results from Chapter 4 with net zero objectives?
- Question 4: What about wealth effects and the fact that mobility and income/wealth interact? Said otherwise: does the policy cause actual changes in the lives of the poorest?
- Question 5: What was your most surprising finding and what was your biggest challenge on the way?

### **Felix CREUTZIG's questions**

Felix CREUTZIG has three questions, to which Charlotte responds as he goes along.

Question 1: How do you know about high and low-income job locations in Cape Town?

Question 2: Do you have data on commuting shares per income class? It is an important information regarding low-income people.

Question 3: I would challenge your conclusions on LEZs by running a full welfare analysis on that. Health aspects are important, and you'd need to know the proportion of unskilled workers living in LEZs.

### **Vincent VIGUIE's questions**



Vincent VIGUIE congratulates Charlotte LIOTTA on her PhD. Before the Ph.D., she did an internship at CIRED on ecosystem services and worked on a World Bank project. She worked with different methods, in different fields, and did her research quickly enough to have papers written in the middle of the Ph.D. She did her own project on Low Emission Zones. In addition, she is involved in the life of the lab.

Vincent VIGUIE has only one question.

Question 1: What is your opinion on the different methods that you used, and what kind of literature do you feel most comfortable with?

Charlotte LIOTTA answers the question.

### **Deliberation**

The jury deliberates in closed session. Then, Geoffrey CARUSO announces the result. The jury has decided to grant Charlotte LIOTTA the title of doctor, with a mark of 1/5 (*very good*) for the manuscript, a mark of 1/5 (*very good*) for the oral presentation, and an overall mark of *magna cum laude*.

Charlotte LIOTTA takes the oath.

Charlotte LIOTTA thanks the jury members, in person and online.

The session ends.