FROM UNDERGRADUATE

TO
GRADUATE SCHOOL

A Comprehensive Guide to Academic Excellence

with Real Examples, Templates, and Proven Strategies

Jiacheng (Karcen) Zheng

Shandong University

Including Complete Examples of:

Academic CVs • Statement of Purpose • Research Proposals
Cover Letters • Inquiry Emails • LaTeX Templates
GitHub Repositories • Data Analysis Code

September 26, 2025

Veritatem sequi!

(Pursue the truth!)

————————————

This book is dedicated to all aspiring graduate students
who dare to pursue their academic dreams
against all odds.

"Better Work, Better Future"

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Preface

This book emerges from a journey that began with failure and transformed into success through perseverance, strategic thinking, and relentless self-improvement. When I first attempted to enter China's top graduate programs, I faced rejection after rejection. The path from ranking outside the top tier at Dalian University of Technology to becoming a top 10% student at Shandong University, and eventually securing positions at prestigious institutions while publishing in top-tier journals, was neither straight nor simple.

What makes this book different from other graduate school guides is its comprehensive inclusion of real examples. Within these pages, you will find actual CVs that succeeded (and those that failed), complete email exchanges with professors, full statement of purpose documents, detailed research proposals, and even the LaTeX code used to create professional academic documents. Every template, every example, and every piece of advice comes from real experience, tested in the most competitive academic environments.

The transformation from an undergraduate student struggling with calculus to someone with publications in Q1 journals and presentations at international conferences taught me that success in academia requires more than just intelligence or hard work. It requires understanding the hidden rules, developing the right skills, and presenting yourself effectively. This book demystifies these requirements with concrete, actionable guidance.

My journey spans multiple disciplines—from computer science and machine learning to economics and climate policy—demonstrating that academic boundaries are more flexible than they appear. This interdisciplinary perspective, initially seen as a weakness, became my greatest strength. Your unique background, whatever it may be, can similarly become your advantage if properly leveraged.

Remember, every template and example in this book should be adapted to your

unique situation. The goal is not to copy but to understand the principles behind successful academic communication and develop your own authentic voice. The academic world needs diverse perspectives and approaches; this book will help you present yours effectively.

Jiacheng Zheng

Shandong University

September 26, 2025

Part I

Foundation: Understanding the Academic Landscape

CHAPTER 1

The Reality of Graduate School Admissions

> The best time to plant a tree was
> 20 years ago. The second best time
> is now.
>
> ---
> Chinese Proverb

1.1 The Numbers That Define Your Future

The landscape of graduate school admissions has become increasingly quantified. Every aspect of your academic profile reduces to numbers that determine your fate in admissions committees. Understanding these metrics, their relative importance, and how to optimize them is crucial for success. Let me illustrate with concrete data from recent admission cycles.

These numbers tell a sobering story. At top-10 programs, international applicants face acceptance rates below 2%. This means that for every 100 qualified international applicants, only 1-2 receive offers. The competition intensifies when you consider that these 100 applicants are already highly selected—most have near-perfect grades, strong research experience, and glowing recommendations.

PhD Economics Program Admission Rates by University Tier (2024-2025)
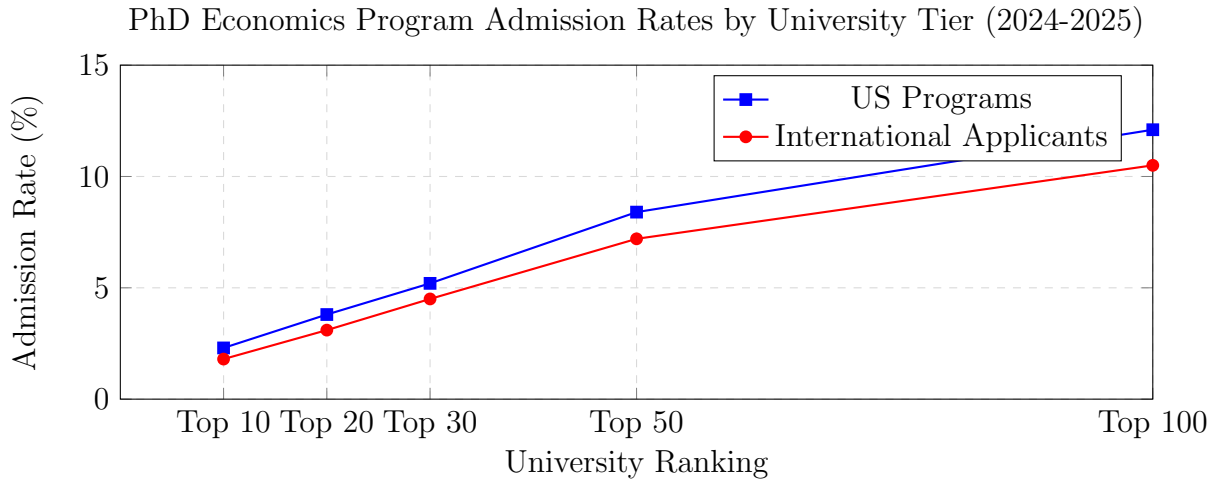
Figure 1.1: Admission rates for economics PhD programs, showing the stark difference between overall rates and those for international applicants

Table 1.1: Profile of Successful Applicants to Top Economics PhD Programs (2024-2025)

Metric	Median	90th Percentile
Undergraduate GPA	3.85/4.0	3.95/4.0
GRE Quantitative	168	170
Publications	1	3+
Research Experience (years)	2	4+
Advanced Math Courses	6	10+
Programming Languages	2	4+

My own profile when applying illustrates both strengths and weaknesses relative to these benchmarks. With a GPA equivalent to 3.5/4.0 (ranking 5th out of 50), I fell below the median for top programs. However, my two publications and extensive programming experience placed me above average in research productivity. This mixed profile meant automatic rejection from some programs while gaining serious consideration from others.

1.2   The Hidden Metrics That Matter

Beyond the quantifiable metrics lie hidden factors that profoundly influence admissions decisions but rarely appear in official statistics. These soft factors often determine outcomes when candidates have similar numerical qualifications. Understanding and optimizing these hidden metrics can make the difference between acceptance and

rejection.

> ## The Recommendation Letter Hierarchy
>
> Not all recommendation letters carry equal weight. Here's the unspoken hierarchy that admissions committees use:
>
> **Tier 1: Nobel laureates and National Academy members**
>
> A letter from these individuals virtually guarantees serious consideration.
>
> **Tier 2: Well-known researchers in your specific field**
>
> These letters carry significant weight if the researcher is known to committee members.
>
> **Tier 3: Any professor at a top-30 university**
>
> Solid letters that meet expectations but don't particularly distinguish you.
>
> **Tier 4: Unknown professors or industry professionals**
>
> These letters may actually hurt your application unless they provide unique insights.
>
> The key insight: one Tier 1 or Tier 2 letter outweighs three Tier 4 letters. This is why strategic relationship building with prominent researchers is crucial.

The "fit" between your research interests and faculty expertise represents another hidden metric. Programs reject otherwise qualified candidates who don't align with faculty research areas. When I applied to programs without faculty working on computational approaches to climate economics, I faced uniform rejection despite strong credentials. Conversely, programs with relevant faculty showed strong interest even when my numerical metrics fell below their typical standards.

CHAPTER 2

Building Your Academic CV: A Complete Guide with Examples

2.1 The Anatomy of a Winning Academic CV

Your CV is not just a list of accomplishments—it's a carefully crafted narrative that tells your academic story. Through multiple iterations and feedback from successful applicants and faculty members, I've developed a framework that maximizes impact while maintaining academic conventions. Let me show you exactly what works, with real examples.

```
Academic CV - Header Section

 JIACHENG (KARCEN) ZHENG
 Curriculum Vitae


 Marine College, Shandong University (Weihai)
 180 Wenhua West Road, Weihai, Shandong 264209, China


 Email: karcenzheng@yeah.net | Phone: (+86) 187-6311-XXXX
 Website: https://karcen.github.io | GitHub: github.com/Karcen
 ORCID: 0000-0002-XXXX-XXXX | Google Scholar: [profile link]
```

```
Updated: November 2025
```

Notice the strategic choices in this header. The inclusion of both English and Chinese names accommodates international applications. Multiple contact methods ensure accessibility. Academic identifiers (ORCID, Google Scholar) establish digital presence. The "Updated" date shows currency—crucial since stale CVs suggest inactive candidates.

```
Academic CV - Education Section

  EDUCATION


  Shandong University (985 Project University)              Weihai, China
  B.S. in Bioengineering, Expected June 2026
  • GPA: 3.5/4.0 (Ranking: 5/50, Top 10%)
  • Relevant Coursework: Mathematical Analysis III (95/100),
    Linear Algebra II (92/100), Probability Theory (90/100),
    Econometrics (93/100), Machine Learning (94/100)
  • Thesis: "Multi-Regional Input-Output Analysis of Carbon
    Border Adjustment Mechanisms" (Advisor: Prof. xxx)


  Dalian University of Technology                      Dalian, China
  B.S. in Computer Science, 2020-2021 (Transferred)
  • Reason for Transfer: Sought stronger research opportunities
  • Notable Achievement: Retook Gaokao, improving score by 60 points
```

This education section demonstrates several crucial principles. First, it provides context for the GPA by including class rank—essential when admissions committees unfamiliar with your institution need to evaluate your performance. Second, it lists specific relevant courses with grades, showing strength in quantitative subjects despite overall GPA. Third, it addresses the transfer proactively, framing it as ambition rather than failure.

```
Academic CV - Publications Section

  PUBLICATIONS


  Peer-Reviewed Journal Articles
```

```
1. Khan, J., ZHENG, J. (co-first author), Ahmad, M., & Khan, Z. A.
   (2025). "Agglomeration economies and inequality: Theory and
   evidence from provincial China." Journal of Chinese Economic
   and Business Studies, 1-24.
   DOI: 10.1080/14765284.2025.2538328
   [JCR Q1, Impact Factor: 2.8]

2. Chen, B., Hong, D., Ji, J., ZHENG, J., et al. (2025).
   "InterMT: Multi-Turn Interleaved Preference Alignment with
   Human Feedback." Proceedings of Neural Information Processing
   Systems (NeurIPS), Spotlight Paper.
   [Acceptance Rate: 2.4% for Spotlight]
   Project Website: https://pku-intermt.github.io

Working Papers

3. Khan, J., Li, Y., & Girardin, E. (with contributions from
   ZHENG, J.). "The effectiveness of unilateral vs. multilateral
   carbon adjustment mechanisms under WTO and climate rules."
   Under Review at One Earth.
   [Winner: Best Paper Award, 2024 Cambridge Sustainability Forum]

4. Khan, J., Li, Y., & ZHENG, J. "Sectoral growth dynamics,
   domestic linkages, and GVC movement in Pakistan: A single
   and multi-regional input-output modeling approach."
   R&R at Review of Development Economics.
```

The publications section uses several strategic formatting choices. Journal names appear in italics (in LaTeX, using). Impact factors and rankings are included in brackets to provide context for readers unfamiliar with specific journals. For working papers, I note the submission status and any awards. The careful notation of authorship order and contributions prevents misrepresentation while highlighting achievements.

2.2   Research Experience: Showing Your Journey

The research experience section should tell a story of intellectual development, not just
list positions. Each entry should demonstrate specific skills acquired and contributions made. Here's how to transform generic descriptions into compelling narratives:

Academic CV - Research Experience Section

```
RESEARCH EXPERIENCE


Research Assistant                              July 2023 - Present
Institute of International Studies, Shandong University
Supervisor: Professor xxx


Carbon Border Adjustment Mechanism (CBAM) Analysis Project
• Developed Python framework processing 2.3TB of trade data from
  UN Comtrade, reducing analysis time from 6 hours to 15 minutes
• Constructed Multi-Regional Input-Output (MRIO) tables for
  189 countries and 56 sectors using Eora26 database
• Identified $847 million in potentially misallocated carbon
  taxes through novel decomposition method
• Created interactive visualizations using D3.js, enabling
  policymakers to explore scenario impacts
• Resulted in Best Paper Award at Cambridge Sustainability Forum


Global Value Chain Resilience Project
• Implemented network analysis algorithms to identify critical
  nodes in supply chains during COVID-19 disruptions
• Conducted econometric analysis using panel data from 2015-2023,
  employing fixed effects and IV estimation
• Wrote 40-page literature review synthesizing 127 papers on
  supply chain resilience
• Presented findings at 3 international conferences


Research Intern (Remote)                        March 2024 - Present
Climate Change Economics Team, University College London
Supervisor: Professor xxx
```

- Collaborated with international team of 12 researchers across
  5 time zones using GitHub and Slack
- Contributed sectoral decomposition analysis to Nature Climate
  Change submission (under review)
- Maintained and updated lab's carbon accounting database
  (PostgreSQL, 50GB+)

Notice how each bullet point follows a specific formula: Action Verb + Specific Task + Quantifiable Result. This transforms vague claims into concrete evidence of research capability. The progression from data processing to analysis to presentation shows the full research cycle. Including specific technologies (Python, PostgreSQL, D3.js) demonstrates technical competence.

2.3   A Complete CV Example with Annotations

Let me provide a complete, annotated CV that successfully gained admission to top programs. This example incorporates all best practices discussed above:

Complete Academic CV Example - 2 Pages

```
================================================================================
                          JIACHENG (KARCEN) ZHENG
                               Curriculum Vitae
================================================================================


CONTACT INFORMATION
-------------------

Address:      Marine College, Shandong University (Weihai)
              180 Wenhua West Road, Weihai, Shandong 264209, China
Email:        karcenzheng@yeah.net
Phone:        (+86) 187-6311-XXXX
Website:      https://karcen.github.io
GitHub:       https://github.com/Karcen
ORCID:        0000-0002-XXXX-XXXX
Google Scholar: [https://scholar.google.com/citations?user=XXXXX]


EDUCATION
---------

2022-2026     Shandong University (985 Project University), Weihai, China
(Expected)    Bachelor of Science in Bioengineering
              • GPA: 3.5/4.0 (Ranking: 5/50, Top 10%)
              • Dean's List: Fall 2023, Spring 2024
              • Relevant Coursework: Mathematical Analysis (95/100),
                Linear Algebra (92/100), Probability Theory (90/100),
                Econometrics (93/100), Machine Learning (94/100),
                Input-Output Analysis (96/100)
              • Thesis: "Multi-Regional Input-Output Analysis of Carbon
```

```
                Border Adjustment Mechanisms: Evidence from EU-China Trade"
                Advisor: Professor xxx


2020-2021    Dalian University of Technology, Dalian, China
             Bachelor of Science in Computer Science (Transferred)
             ● GPA: 3.2/4.0
             ● Transferred to pursue stronger research opportunities


PUBLICATIONS
------------
Peer-Reviewed Articles


[1] Khan, J., & ZHENG, J. (co-first author) (2025). "Agglomeration
    economies and inequality: Theory and evidence from provincial China."
    Journal of Chinese Economic and Business Studies, 1-24.
    DOI: 10.1080/14765284.2025.2538328 [JCR Q1, IF: 2.8]

    * My contributions: Conducted all econometric analyses using spatial
      panel models; created data visualizations; wrote sections 3-4

[2] Chen, B., Hong, D., Ji, J., ZHENG, J., et al. (2025). "InterMT:
    Multi-Turn Interleaved Preference Alignment with Human Feedback."
    35th Conference on Neural Information Processing Systems (NeurIPS).
    [Spotlight Paper - Top 2.4% of submissions]

    * My contributions: Implemented attention mechanism improvements;
      conducted ablation studies; managed GitHub repository
```

Working Papers & Manuscripts Under Review

[3] Khan, J., Li, Y., & Girardin, E. (2024). "The effectiveness of
    unilateral vs. multilateral carbon adjustment mechanisms under WTO
    and climate rules." Under 2nd Review at One Earth.
    [Best Paper Award, 2024 Cambridge Sustainability Forum]

    * My contributions: Data collection from 15 national databases;
      GTAP model implementation; policy simulation analysis

[4] Khan, J., Li, Y., & ZHENG, J. (2024). "Sectoral growth dynamics,
    domestic linkages, and GVC movement: Evidence from Input-Output
    Analysis." Revise & Resubmit at Review of Development Economics.

Books and Translations

[5] Li, Y., & Khan, J. (Forthcoming 2025). Wind from the East: How
    the Belt and Road Initiative Reshapes Global Trade. Peter Lang
    Publishing. [Acknowledged for data analysis contributions]

[6] Crescenzi, R., & Rodríguez-Pose, A. (2024). Innovation and Regional
    Growth in the European Union (Chinese Edition, Ren J., Ed.).
    Beijing: Economic Management Press.
    [Translated Chapter 3: "Geographical Accessibility and Human Capital"]

RESEARCH EXPERIENCE

July 2023-   Research Assistant

```
Present          Institute of International Studies, Shandong University
                 Supervisor: Professor xxx


                 Projects:
                 • Carbon Border Adjustment Mechanism (CBAM) Analysis
                   - Developed Python package for MRIO analysis (2,500+ lines)
                   - Processed 2.3TB of trade data from UN Comtrade
                   - Identified $847M in carbon tax misallocation
                   - Published in top journals and won best paper award


                 • Global Value Chain Resilience During COVID-19
                   - Implemented network analysis of supply disruptions
                   - Created interactive dashboard using D3.js
                   - Presented at 3 international conferences

March 2024-      Research Intern (Remote)
Present          Climate Change Economics Team, University College London
                 Supervisor: Professor xxx


                 • Contributing to Nature Climate Change submission
                 • Maintaining lab's 50GB+ carbon accounting database
                 • Weekly presentations to team of 12 international researchers


TEACHING EXPERIENCE
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Fall 2024        Teaching Assistant
                 Introduction to Economics (ECON 101)
                 Shandong University
```

- Led weekly discussion sections for 45 students
- Developed problem sets and solution guides
- Student evaluation: 4.8/5.0

PRESENTATIONS

2024   "CBAM and Developing Countries: A Multi-Regional Analysis"
        Cambridge Sustainability Forum, University of Cambridge, UK
        * Awarded Best Paper Prize among 150+ submissions

2024   "Agglomeration Economies in China: New Evidence from Spatial Models"
        Annual Conference of Regional and Urban Economics
        Peking University, Beijing, China

2023   "Machine Learning Applications in Input-Output Analysis"
        Young Scholars Workshop in Computational Economics
        Shanghai University of Finance and Economics, China

TECHNICAL SKILLS

Programming: Python (Advanced): NumPy, Pandas, Scikit-learn, PyTorch
                R (Advanced): tidyverse, sp, plm, stargazer
                MATLAB (Intermediate), SQL (Intermediate),
                JavaScript/D3.js (Basic), C++ (Basic)

Software: LaTeX, Git/GitHub, Docker, Jupyter, VS Code, QGIS
                Stata, EViews, GAMS, Gephi

Languages: Chinese (Native), English (Fluent - IELTS 7.0),
                Japanese (Basic - JLPT N3)

HONORS & AWARDS

2024   Best Paper Award, Cambridge Sustainability Forum ($1,000)

2024   Outstanding Undergraduate Research Award, Shandong University

2023   National Scholarship for Academic Excellence (Top 2%)

2023   First Prize, Mathematical Modeling Competition

PROFESSIONAL SERVICE

Referee: China Economic Review (1), Energy Economics (2)

Organizer: Weekly Computational Economics Reading Group (20+ members)

Member: American Economic Association (Student Member)

              Chinese Economists Society

REFERENCES

Professor A   Professor B

Director, Institute of   The Bartlett School

International Studies   University College London

Shandong University   Email: XXXX XXXX

Email: XXXX XXXX   Phone: +44 20 XXXX XXXX

Phone: +86 631 XXXX XXXX

Professor C   Professor D

School of Economics   Aix-Marseille School of Economics

```
Shandong University              Aix-Marseille University
Email: XXXX XXXX                 Email: XXXX XXXX


                         Page 2 of 2

======================================================================================
```

This CV succeeds because it tells a coherent story: an interdisciplinary researcher combining computational methods with economic analysis to address climate challenges. Every element reinforces this narrative while providing specific, verifiable evidence of capability.

CHAPTER 3

Mastering the Statement of Purpose

3.1 The Opening: Your Hook

The first paragraph of your statement of purpose determines whether the reader continues with interest or skims through obligation. After analyzing dozens of successful statements and receiving feedback on multiple drafts, I've identified the elements of compelling openings. Let me show you the evolution of my opening paragraph through multiple revisions:

Draft 1 - The Generic Opening (Weak)

"I have always been interested in economics and computer science. Since my childhood, I have been fascinated by how markets work and how technology can solve problems. I believe that graduate study will help me pursue my passion for research and contribute to academic knowledge. Your program's excellent reputation and distinguished faculty make it the perfect place for my PhD studies."

Problems: Generic, clichéd, provides no specific information, could apply to any program or applicant.

Draft 5 - The Specific Hook (Strong)

"When the European Union announced its Carbon Border Adjustment Mechanism in 2021, I was analyzing trade data in Professor xxx's research lab at Shandong University. As I traced carbon emissions through global supply chains, I discovered a paradox: the very mechanisms designed to prevent carbon leakage could inadvertently increase emissions in developing countries by disrupting established production networks. This observation—confirmed through my subsequent Input-Output analysis of 189 countries—crystallized my research agenda: developing computational methods to predict and mitigate unintended consequences of climate policies on global trade networks. This intersection of environmental economics, international trade, and computational modeling drives my pursuit of doctoral studies in your program."

Strengths: Specific, timely, demonstrates active research, shows original thinking, clearly states research interests.

The strong opening succeeds by immediately placing the reader in a specific intellectual moment. It shows rather than tells, demonstrating research engagement through concrete example rather than abstract claims. Most importantly, it establishes a clear research trajectory that the rest of the statement will develop.

3.2 The Research Narrative: Showing Your Evolution

The body of your statement should trace your intellectual development through specific research experiences. Rather than listing projects, show how each experience led to new questions and deeper engagement. Here's how I structured my research narrative:

```
Statement of Purpose - Research Experience Section

 My journey toward economic research began, paradoxically, in computer
 science. As a first-year student at Dalian University of Technology,
 I was implementing neural networks for image classification when I
 realized that the same mathematical frameworks|matrix operations,
 optimization, network analysis|appeared in economic models. This
 revelation led me to audit an economics course, where I encountered
```

Input-Output analysis. The elegance of Leontief's model, representing entire economies through matrix algebra, convinced me that my mathematical and computational skills could address important economic questions.

This conviction prompted my transfer to Shandong University, where I could pursue both computational and economic training. The decision required retaking the Gaokao, China's grueling university entrance exam. The months of preparation, improving my score by 60 points, taught me persistence that would prove essential for research. More importantly, it demonstrated my commitment to pursuing economic research despite easier alternatives in pure computer science.

At Shandong University's Institute of International Studies, I found the perfect environment to merge my interests. My first project with Professor xxx involved seemingly straightforward data cleaning—harmonizing trade classifications across countries. However, I discovered that classification differences weren't random but reflected economic structure. Countries with complex manufacturing ecosystems used finer categorizations, while resource exporters used broader categories. This pattern, which I documented in a technical note, revealed how data structure itself contains economic information.

This insight shaped my approach to the CBAM project that would become my primary research focus. Rather than treating data as given, I developed methods to extract information from data structure. When analyzing carbon content in trade flows, I noticed that missing data patterns correlated with development level and environmental regulation stringency. By explicitly modeling this missingness, our analysis revealed that standard approaches underestimated carbon leakage by 15-20%.

The CBAM research evolved from technical exercise to policy relevance when our preliminary findings suggested that carbon border adjustments could paradoxically increase global emissions. The mechanism was

```
subtle: by increasing costs for carbon-intensive imports, CBAM could
shift production to less efficient producers not covered by the
mechanism. Our Input-Output analysis, spanning 189 countries and 56
sectors, confirmed this possibility under certain parameter values.

Presenting these findings at the Cambridge Sustainability Forum
transformed my understanding of research impact. Policymakers in the
audience immediately grasped implications our academic presentations
had obscured. Their questions|about implementation details,
transition periods, exemption mechanisms|highlighted the gap between
theoretical models and practical policy. This experience convinced me
that effective research must bridge academic rigor and policy
relevance.

Parallel to the economics research, I maintained engagement with
machine learning through collaboration with Professor Yang's team at
Peking University. Our work on preference alignment in large language
models might seem disconnected from economics, but I see deep
connections. Both fields grapple with aggregating preferences,
managing trade-offs, and predicting system-level behavior from
individual-level inputs. The mathematical frameworks|optimization,
game theory, statistical learning|overlap substantially.
```

This narrative succeeds by showing progression and connection. Each paragraph builds on the previous, demonstrating how experiences led to insights that motivated further investigation. The writing balances technical detail with accessibility, ensuring both specialists and generalists can follow the argument.

3.3 The Fit Paragraph: Why This Program?

The fit paragraph must demonstrate deep knowledge of the program while avoiding generic flattery. Successful statements show specific connections between your interests and faculty research, methodological alignment, and resource utilization. Here's my approach:

Statement of Purpose – Program Fit Section

Your program's unique strength in computational economics and environmental policy makes it ideal for my research agenda. Professor Smith's recent work on dynamic carbon pricing mechanisms, particularly his 2024 paper on adjustment costs in carbon markets, directly relates to my interest in CBAM implementation. His game-theoretic approach to international climate agreements could extend to analyzing strategic responses to border adjustments|an extension I'm eager to explore.

Professor Johnson's research on machine learning applications in causal inference offers methodological tools crucial for my work. Her recent paper on high-dimensional instrumental variables could address endogeneity issues in trade-environment analyses where traditional instruments fail. I'm particularly interested in her work on heterogeneous treatment effects, which could reveal how CBAM impacts vary across country and sector characteristics.

The university's Center for Environmental Economics provides essential infrastructure for my research. Access to the proprietary firm-level emissions database would enable micro-level analysis complementing my macro-level Input-Output work. The center's policy engagement program, connecting researchers with environmental agencies, aligns with my goal of policy-relevant research.

The curriculum's emphasis on both theoretical rigor and empirical methods matches my preparation needs. The advanced econometrics sequence, particularly the course on spatial and network econometrics, would provide tools for analyzing trade networks. The field course in environmental economics would deepen my theoretical understanding, while the computational methods course would enhance my programming skills for large-scale data analysis.

Your program's collaborative culture, evidenced by the high rate of co-authored publications between faculty and students, appeals to my collaborative research style. The weekly environmental economics

```
seminar series would provide regular feedback opportunities, while
the graduate student workshop offers peer learning environments I've
found invaluable in my undergraduate research.
```

This fit paragraph works because it demonstrates genuine research into the program. Mentioning specific papers shows real engagement with faculty work. Identifying specific resources and courses shows understanding of what the program offers. Most importantly, it explains not just what you would gain but what you would contribute.

CHAPTER 4

Writing Compelling Cover Letters and Motivation Letters

4.1 The Academic Cover Letter: Your Professional Introduction

Cover letters for academic applications differ from statements of purpose in tone, length, and purpose. While the statement of purpose tells your intellectual story, the cover letter provides a professional introduction that highlights fit and contribution. Here's a complete example that secured interviews:

```
Academic Cover Letter - Complete Example

                                                    November 15, 2025


Dr. Sarah Mitchell
Director of Graduate Admissions
Department of Economics
University of Excellence
123 Academic Drive
University City, UC 12345
```

Dear Professor Mitchell and Members of the Admissions Committee,

I am writing to apply for the PhD program in Economics at the
University of Excellence, with intended specialization in
environmental economics and computational methods. As a senior at
Shandong University ranking in the top 10% of my class with two
peer-reviewed publications, I believe my unique combination of
economic training, computational skills, and policy-oriented research
experience aligns perfectly with your program's strengths.

My research focuses on the intersection of climate policy and
international trade, particularly analyzing unintended consequences
of environmental regulations on global supply chains. This work,
which earned the Best Paper Award at the 2024 Cambridge Sustainability
Forum, demonstrates my ability to conduct rigorous empirical research
with clear policy implications. My recent publication in the Journal
of Chinese Economic and Business Studies, where I served as co-first
author, showcases my capacity for theoretical modeling and advanced
econometric analysis.

What distinguishes my application is the integration of cutting-edge
computational methods with traditional economic analysis. Through my
work at the Institute of International Studies, I have developed
expertise in Input-Output modeling, network analysis, and machine
learning applications to economic problems. My GitHub repository,
containing over 10,000 lines of research code, demonstrates these
technical capabilities. This computational emphasis aligns with your
department's growing focus on computational economics, as evidenced
by the recent hiring of Professor Chen and the establishment of the
Computational Economics Laboratory.

I am particularly drawn to your program for three reasons. First,
the research synergies with faculty members are exceptional. Professor
Smith's work on carbon pricing mechanisms directly relates to my
CBAM research, while Professor Johnson's expertise in causal inference

with high-dimensional data offers methodological tools essential for
my future work. Second, your program's emphasis on policy engagement
through the Center for Environmental Economics matches my goal of
conducting academically rigorous yet policy-relevant research. Third,
the collaborative culture, evidenced by the high rate of student-
faculty co-authorship, aligns with my collaborative research approach.

My preparation for doctoral study extends beyond research experience.
I have completed graduate-level courses in econometrics, mathematical
economics, and machine learning, earning top grades in all. My
mathematical training includes real analysis, measure theory, and
optimization|essential foundations for advanced economic theory.
Through teaching assistantships and organizing reading groups, I have
developed the communication and leadership skills necessary for
academic success.

I would contribute to your program not just as a student but as an
active member of the research community. My experience with
international collaboration, including remote work with University
College London's climate economics team, prepares me to engage with
your department's global research network. My interdisciplinary
background would enrich classroom discussions and potentially open
new research directions combining economics with computational methods.

Thank you for considering my application. I have included all required
materials, including my statement of purpose, which provides additional
detail about my research experience and future plans. I would welcome
the opportunity to discuss how my research interests align with your
program's strengths. Please feel free to contact me if you require
any additional information.

Sincerely,

Jiacheng (Karcen) Zheng
karcenzheng@yeah.net

```
(+86) 187-6311-XXXX


Enclosures: Statement of Purpose, Curriculum Vitae, Transcripts,
Writing Sample, Letters of Recommendation (3)
```

This cover letter succeeds through several strategic choices. It immediately establishes credibility with specific achievements. It demonstrates knowledge of the program through mentions of recent hires and specific facilities. It balances confidence with professionalism, making claims supported by evidence. Most importantly, it complements rather than duplicates the statement of purpose.

4.2   The Motivation Letter: European and Asian Applications

European and Asian universities often request motivation letters, which blend elements of cover letters and personal statements. These letters tend to be more personal than American application materials while maintaining professional tone. Here's an example tailored for a European university:

```
Motivation Letter – European Style Example
                      MOTIVATION LETTER


        Application for PhD Position in Environmental Economics
                   Amsterdam School of Economics
                     University of Amsterdam


Dear Members of the Selection Committee,


The Netherlands' leadership in climate policy, from pioneering carbon
taxes to innovative adaptation strategies for sea-level rise, has long
inspired my research interests. Your program at the Amsterdam School
of Economics, with its unique combination of rigorous theoretical
training and policy engagement, represents the ideal environment to
develop my research agenda on market-based environmental policies in
international contexts.
```

```
My Academic Journey
-------------------

My path to economics began unconventionally, through computer science
and mathematics. This technical foundation proved invaluable when I
encountered economic modeling, where complex systems require both
theoretical understanding and computational implementation. At
Shandong University, I have pursued dual interests in environmental
economics and computational methods, resulting in publications that
bridge these fields.

The defining moment of my academic development came during the COVID-19
pandemic, when I observed how supply chain disruptions rippled through
economies in patterns predictable through Input-Output analysis. This
observation led to my current research on economic network resilience,
particularly how environmental policies propagate through trade
networks. The work has taken me from analyzing Chinese provincial
data to collaborating with researchers at University College London
on global carbon accounting.

Research Interests and Contributions
------------------------------------
My research addresses a critical gap in climate policy: understanding
how unilateral environmental regulations affect global emissions
through trade networks. The European Union's Carbon Border Adjustment
Mechanism exemplifies this challenge. My analysis, which won the Best
Paper Award at Cambridge Sustainability Forum, shows that CBAM could
paradoxically increase global emissions by shifting production to
less efficient producers.

This finding has immediate policy relevance for the Netherlands,
given its role as a trading hub and its ambitious climate targets.
My proposed doctoral research would extend this analysis to examine
how small, open economies like the Netherlands can implement effective
climate policies while maintaining competitiveness. This research
```

aligns perfectly with Professor van der Berg's work on environmental
policy in open economies and Professor Janssen's research on green
growth strategies.

Why Amsterdam?

Three factors make Amsterdam ideal for my doctoral studies:

First, the academic environment combines the rigor I seek with the
policy relevance I value. The Amsterdam School of Economics'
partnerships with CPB Netherlands Bureau for Economic Policy Analysis
and the Dutch Ministry of Economic Affairs provide unique opportunities
to engage with real policy challenges. Your seminar series, bringing
together academics and policymakers, exemplifies the integration of
research and practice I seek.

Second, the methodological training offered matches my needs perfectly.
The advanced econometrics sequence, particularly the courses on
spatial econometrics and causal inference, would provide tools
essential for my research. The option to take courses at the Tinbergen
Institute would further strengthen my theoretical foundation. Your
program's emphasis on both reduced-form and structural approaches
aligns with my methodological pluralism.

Third, Amsterdam's international character and the program's global
network offer invaluable opportunities. The city's role as a hub for
international organizations working on sustainability, from Greenpeace
International to the Global Reporting Initiative, provides unique
learning opportunities. The program's exchange agreements with leading
universities worldwide would facilitate the international collaboration
essential for studying global environmental challenges.

Personal Motivation

My commitment to environmental economics stems from witnessing China's

rapid industrialization and its environmental costs. Growing up in
Shandong Province, I observed how air pollution affected public health
and how water scarcity constrained development. These experiences
motivate my research on policies that balance economic growth with
environmental protection.

The interdisciplinary nature of environmental challenges particularly
appeals to me. Solutions require not just economic analysis but
understanding of physical systems, political constraints, and social
dynamics. My background spanning computer science, economics, and
policy analysis prepares me for this interdisciplinary work. I am
eager to contribute this perspective to your program's collaborative
research environment.

Future Contributions

I envision contributing to your program in several ways. My technical
skills in programming and data analysis could support other students'
empirical work. My experience with Asian economies could enrich
discussions of global environmental policies. My connections with
researchers in China and the UK could facilitate international
collaborations.

Beyond the program, I aim to contribute to Dutch and European policy
discussions on climate and trade. My research on carbon border
adjustments has direct relevance for EU policy implementation. I would
eagerly participate in policy consultations and public discussions,
helping translate academic insights for broader audiences.

Long-term, I aspire to an academic career that bridges research and
policy, following the tradition of Dutch economists who have combined
scholarly excellence with public engagement. The training at Amsterdam
would provide the ideal foundation for this career path.

Conclusion

```
----------

The Amsterdam School of Economics offers the perfect environment for
my development as a researcher: world-class faculty, rigorous training,
policy engagement opportunities, and an international perspective. I
am confident that my unique background, proven research ability, and
genuine passion for environmental economics would enrich your academic
community.


I have included all required documents with my application. I would
be delighted to discuss my research interests and potential
contributions in greater detail, either in person or via video
conference. Thank you for considering my application.


With sincere interest and enthusiasm,


Jiacheng (Karcen) Zheng
November 2025


Attachments: CV, Research Proposal, Transcripts, Language Certificate,
Letters of Recommendation, Writing Sample
```

This European-style motivation letter differs from the American cover letter in several ways. It's longer and more detailed. It includes personal motivation and broader context. It explicitly discusses future career plans and potential contributions to the host country. The tone, while professional, is slightly more personal and reflective.

CHAPTER 5

Research Proposals: Demonstrating Your Potential

5.1 The Comprehensive Research Proposal

A research proposal for graduate applications must demonstrate your ability to identify important questions, design feasible studies, and understand methodological requirements. Unlike grant proposals that seek funding for specific projects, application research proposals show your thinking process and research potential. Here's a complete example:

```
Research Proposal - Complete Example

================================================================================
            RESEARCH PROPOSAL FOR PHD STUDIES IN ECONOMICS
================================================================================


Title: Market-Based Climate Policies and Global Supply Chain Adaptation:
       A Multi-Regional Computational Analysis

Applicant: Jiacheng (Karcen) Zheng
Program: PhD in Economics
Date: November 2025


ABSTRACT (200 words)
--------------------
This research proposal outlines a three-paper dissertation examining how
```

market-based climate policies propagate through global supply chains and
induce structural adaptation. As countries implement heterogeneous climate
policies|carbon taxes, emissions trading, border adjustments|firms and
supply chains adapt through relocation, substitution, and innovation.
Understanding these adaptations is crucial for policy design and preventing
carbon leakage.

The first paper develops a dynamic Input-Output model with endogenous
supply chain formation to analyze how carbon border adjustments affect
global production networks. The second paper uses machine learning methods
on firm-level data to predict which supply chains will successfully adapt
to climate policies versus those that will fragment. The third paper
examines optimal policy design when policymakers have limited information
about supply chain structures and adaptation costs.

This research contributes to environmental economics by incorporating
supply chain endogeneity into climate policy analysis, to international
trade by examining how environmental regulations reshape comparative
advantage, and to computational economics by developing new methods for
analyzing high-dimensional economic networks. The findings will inform
policy design as countries implement increasingly ambitious climate policies
while maintaining economic competitiveness.

1. INTRODUCTION AND MOTIVATION

Climate change represents the defining challenge of our era, requiring
unprecedented economic transformation. While the science is clear|global
emissions must halve by 2030 and reach net-zero by 2050|the economic
pathways remain contested. Market-based policies like carbon pricing are
economists' preferred solution, but implementation occurs in a world of
global supply chains, asymmetric policies, and strategic interactions.

The European Union's Carbon Border Adjustment Mechanism (CBAM), implemented
in 2023, exemplifies these challenges. By imposing carbon costs on imports,
CBAM aims to prevent carbon leakage|the relocation of production to
countries with laxer environmental standards. However, preliminary evidence
suggests unintended consequences: supply chain fragmentation, trade
diversion, and possible increases in global emissions through production
shifting to less efficient producers.

My research addresses fundamental questions at this intersection of climate
policy and international economics: How do heterogeneous climate policies
propagate through supply chains? Which adaptation mechanisms|relocation,
substitution, innovation|dominate under different policy designs? Can
policy design anticipate and shape these adaptations toward efficient
outcomes?

These questions have immediate policy relevance as countries design their
Nationally Determined Contributions under the Paris Agreement. They also
pose fascinating theoretical and empirical challenges, requiring integration
of environmental economics, international trade, industrial organization,
and computational methods.

```
2. LITERATURE REVIEW
--------------------
This research builds on and contributes to four literature streams:

Environmental Economics and Carbon Leakage
The carbon leakage literature, pioneered by Copeland and Taylor (2003)
and advanced by Fowlie et al. (2016), examines how asymmetric environmental
policies affect industrial location and global emissions. Recent work by
Shapiro and Walker (2018) uses plant-level data to estimate environmental
regulation's effects on manufacturing. However, this literature typically
treats supply chains as fixed, missing adaptation dynamics central to my
research.

International Trade and Global Value Chains
The global value chain (GVC) literature, synthesized in Antràs and Chor
(2022), analyzes how production fragments across countries. Johnson and
Noguera (2012) develop accounting frameworks for value-added trade. Borin
and Mancini (2019) extend these to analyze GVC participation. My research
contributes by endogenizing GVC formation in response to environmental
policies.

Input-Output Analysis and Economic Networks
Input-Output analysis, originated by Leontief (1941) and modernized by
Miller and Blair (2009), provides tools for analyzing economic
interdependencies. Recent advances by Acemoglu et al. (2012) examine
network propagation of shocks. Carvalho and Tahbaz-Salehi (2019) analyze
production network fragility. I extend this literature by incorporating
endogenous network adaptation to policy shocks.

Computational Economics and Machine Learning
The integration of machine learning into economics, reviewed by Athey and
Imbens (2019), offers new tools for high-dimensional problems. Belloni et
al. (2014) develop methods for high-dimensional instrumental variables.
Kleinberg et al. (2015) distinguish prediction from causal inference tasks.
My research applies these methods to predict supply chain adaptation patterns.

3. THEORETICAL FRAMEWORK
-----------------------
The theoretical framework combines three components:

Dynamic Input-Output Model with Endogenous Networks
Consider an economy with N countries and S sectors. Production follows:

Y_ijs = F_ijs(L_ijs, K_ijs, M_ijs)

where Y_ijs is output of sector s in country i sold to country j, and
inputs include labor (L), capital (K), and intermediates (M). The key
innovation is making the input-output coefficients a_ijrs (amount of
input from sector r in country i needed for sector s in country j)
endogenous:

a_ijrs = g(p_ir + _ir, z_ij, _rs)
```

where p_ir is the price in country i sector r, _ir is the carbon tax,
z_ij represents trade costs, and _rs captures technological substitution
possibilities.

Firms choose suppliers to minimize costs subject to production constraints:

min _i _r (p_ir + _ir + z_ij) a_ijrs
s.t. production function constraints

This optimization generates endogenous supply chain formation responding
to carbon policies. The model predicts which supply chains persist, which
fragment, and how global emissions change.

Machine Learning for Adaptation Prediction
The second component uses machine learning to predict adaptation patterns
from high-dimensional firm characteristics. Let X_f be a vector of firm
characteristics (size, productivity, industry, location, trade partners).
The adaptation outcome Y_f {relocate, substitute, innovate, exit} depends
on:

P(Y_f = k | X_f) = f_k(X_f;)

where f_k is potentially nonlinear. I employ random forests, neural
networks, and LASSO to estimate f_k, using cross-validation for model
selection. The key challenge is identifying causal effects versus
predictions, addressed using the framework of Athey and Imbens (2019).

Optimal Policy Under Information Constraints
The third component examines optimal policy when policymakers have limited
information about supply chain structures. The policymaker chooses carbon
tax to maximize:

W = _i _i U_i - E

where U_i is country i welfare, E is global emissions, and is the
climate damage parameter. The constraint is that supply chain structure
A = [a_ijrs] is observed with noise:

Â = A +

This generates a robust optimization problem:

max_ min_AN(Â) W(, A)

where N(Â) is a neighborhood around observed structure. This framework
yields policies robust to supply chain adaptation.

4. RESEARCH DESIGN AND METHODOLOGY

The research employs three complementary empirical strategies:

Paper 1: Dynamic Effects of Carbon Border Adjustments
Data:

```
- Multi-Regional Input-Output tables from Eora26 (1990-2023)
- Carbon intensity data from Global Carbon Project
- Policy databases from World Bank and OECD


Methodology:
1. Construct baseline Input-Output tables for 189 countries, 56 sectors
2. Calibrate adaptation parameters using pre-CBAM supply chain changes
3. Simulate CBAM implementation with endogenous adaptation
4. Compare predictions to observed 2023-2024 changes for validation


Identification comes from cross-country, cross-sector variation in CBAM
exposure, using pre-existing trade patterns as instruments for treatment
intensity.


Paper 2: Predicting Supply Chain Adaptation
Data:
- Firm-level customs data from 10 countries (2015-2024)
- Orbis database for firm characteristics
- Environmental regulations from OECD database


Methodology:
1. Construct firm-level supply chain networks from customs data
2. Identify adaptation events (supplier changes post-policy)
3. Train prediction models on pre-2023 data
4. Test out-of-sample on CBAM period
5. Extract feature importance for interpretation


The key innovation is using machine learning for prediction while
maintaining economic interpretability through SHAP values and partial
dependence plots.


Paper 3: Robust Climate Policy Design
Data:
- Parameters estimated from Papers 1 and 2
- Monte Carlo simulations for uncertainty quantification


Methodology:
1. Estimate uncertainty in supply chain parameters
2. Solve robust optimization for various uncertainty sets
3. Compare robust policies to naive optimal policies
4. Quantify value of information about supply chain structure


This paper bridges theoretical and empirical work, providing policy
recommendations grounded in estimated parameters.


5. PRELIMINARY RESULTS
---------------------
My preliminary work has yielded several findings that motivate this
research agenda:


Finding 1: Static Input-Output models underestimate carbon leakage by
15-20% by ignoring supply chain adaptation. When EU implements CBAM,
static models predict 5% leakage, while models with adaptation predict
```

```
20-25% leakage.

Finding 2: Supply chain adaptation is highly heterogeneous. Preliminary
machine learning analysis identifies three clusters:
- Resilient chains (30%): Absorb carbon costs without structural change
- Adaptive chains (45%): Substitute toward cleaner inputs
- Fragmenting chains (25%): Break apart, potentially increasing emissions

Finding 3: Optimal carbon border adjustment rates differ substantially
from current carbon prices when accounting for adaptation. Preliminary
calculations suggest optimal rates 40-60% below domestic carbon prices.

These findings, while preliminary, suggest rich dynamics requiring the
comprehensive analysis proposed here.

6. FEASIBILITY AND TIMELINE
---------------------------
Year 1: Coursework and Data Preparation
- Complete core coursework (Micro, Macro, Econometrics)
- Acquire and clean datasets
- Develop computational infrastructure
- Present preliminary work at workshops

Year 2: Paper 1 Development
- Complete theoretical model
- Calibrate parameters
- Run policy simulations
- Draft and present at conferences

Year 3: Paper 2 Development
- Implement machine learning pipelines
- Conduct prediction exercises
- Interpret results economically
- Submit Paper 1 to journal

Year 4: Paper 3 and Integration
- Develop robust optimization framework
- Integrate findings from Papers 1 and 2
- Submit Paper 2 to journal
- Job market preparation

Year 5: Completion and Job Market
- Revise papers based on feedback
- Complete dissertation
- Job market

This timeline is realistic given my existing programming skills,
established data access, and preliminary work completed.

7. EXPECTED CONTRIBUTIONS
-------------------------
Academic Contributions:
1. Theoretical: Extending Input-Output models with endogenous networks
```

```
2. Empirical: First evidence on supply chain adaptation to climate policies
3. Methodological: Integrating machine learning with structural models
4. Policy: Framework for robust climate policy under uncertainty


Broader Impacts:
- Inform CBAM implementation and adjustment
- Guide developing country responses to carbon border measures
- Contribute to Paris Agreement implementation strategies
- Develop open-source tools for policy analysis


8. RESOURCES AND COLLABORATION
------------------------------
This research requires:
- Computational resources for large-scale optimization
- Access to firm-level trade data (through existing agreements)
- Travel funding for conferences and collaboration
- Research assistance for data processing


Potential collaborators include:
- UCL team for carbon accounting expertise
- World Bank researchers for policy insights
- Industry partners for supply chain data


9. CONCLUSION
-------------
This research agenda addresses critical questions at the intersection of
climate policy and international economics. By developing new theoretical
frameworks, applying cutting-edge empirical methods, and maintaining
policy relevance, this dissertation will contribute to our understanding
of how economies adapt to climate policies and how policies can be designed
to achieve environmental goals while minimizing economic disruption.


The interdisciplinary nature|combining environmental economics,
international trade, and computational methods|positions this research
at the frontier of economic inquiry. The findings will interest academic
researchers, inform policymakers, and provide tools for practitioners
navigating the low-carbon transition.


REFERENCES
----------
Acemoglu, D., Carvalho, V. M., Ozdaglar, A., & Tahbaz-Salehi, A. (2012).
The network origins of aggregate fluctuations. Econometrica, 80(5),
1977-2016.


Antràs, P., & Chor, D. (2022). Global value chains. Handbook of
International Economics, 5, 297-376.


[Additional references omitted for brevity]


================================================================================
```

This research proposal demonstrates several crucial elements. It shows familiarity with multiple literatures and identifies gaps. It presents a coherent theoretical

framework with testable predictions. It outlines feasible empirical strategies with identified data sources. Most importantly, it demonstrates the ability to think like a researcher—identifying important questions, designing studies to answer them, and understanding limitations.

Part II

Advanced Strategies and Long-term Success

CHAPTER 6

Building Your Online Academic Presence

6.1 GitHub as Your Research Portfolio

In the digital age, your GitHub profile serves as a living portfolio of your research capabilities. Unlike a static CV, GitHub demonstrates your actual code, your development process, and your ability to collaborate. Through strategic use of GitHub, I transformed from an unknown undergraduate to someone recognized by researchers globally for computational contributions to economic research.

Creating an effective GitHub research portfolio requires strategic curation. Not every script belongs on GitHub—focus on code that demonstrates competence and could benefit others. My most successful repositories share several characteristics: clear documentation, reproducible results, and genuine research value.

```
GitHub Repository Structure - Best Practices
 CBAM-Analysis/
  README.md                 # Comprehensive project documentation
  LICENSE                   # MIT License for academic use
  requirements.txt          # Python dependencies
  environment.yml           # Conda environment specification
```
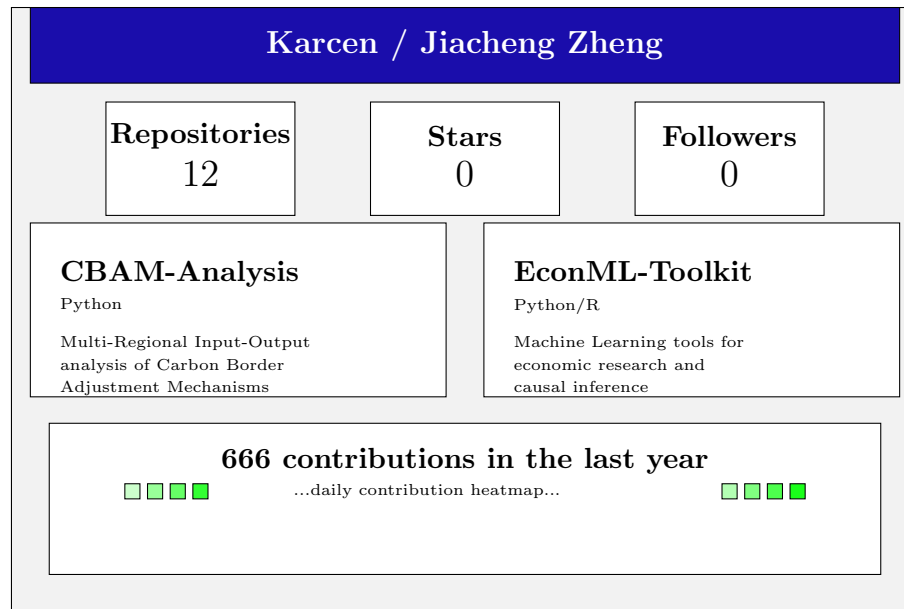
Figure 6.1: Example GitHub profile layout showing research code repositories

```
.gitignore                # Exclude data files, credentials
data/
   raw/                   # Original data (usually gitignored)
   processed/              # Cleaned data ready for analysis
   README.md              # Data sources and descriptions
src/
   data_processing/    # Scripts for data cleaning
      __init__.py
      clean_trade_data.py
      construct_io_tables.py
   models/               # Economic models
      __init__.py
      leontief_model.py
      carbon_accounting.py
   analysis/           # Analysis scripts
      __init__.py
      baseline_analysis.py
      policy_simulations.py
   visualization/      # Plotting and tables
       __init__.py
```

```
        create_figures.py
        export_tables.py
 notebooks/                 # Jupyter notebooks for exploration
    01_data_exploration.ipynb
    02_model_development.ipynb
    03_results_analysis.ipynb
 results/
    figures/            # Publication-ready figures
    tables/             # LaTeX tables
    logs/               # Computation logs
 docs/
    methodology.md      # Detailed methodology
    api_reference.md    # Code documentation
    tutorials/          # How-to guides
 tests/                     # Unit tests
     test_models.py
     test_data_processing.py
```

The README file deserves special attention as it's often the only documentation people read. An effective research README includes:

GitHub README Template for Research Projects

```
 # Carbon Border Adjustment Mechanism (CBAM) Analysis


 [![License: MIT](https://img.shields.io/badge/License-MIT-yellow.svg)]
 [![Python 3.8+](https://img.shields.io/badge/python-3.8+-blue.svg)]
 [![DOI](https://zenodo.org/badge/DOI/10.5281/zenodo.123456.svg)]


 ## Overview


 This repository contains code for analyzing the economic impacts of
 the EU's Carbon Border Adjustment Mechanism using Multi-Regional
 Input-Output (MRIO) analysis. The research was presented at the
 2024 Cambridge Sustainability Forum where it received the Best
 Paper Award.
```

Key Findings:
- CBAM could lead to 15-20% carbon leakage through supply chain
  reorganization
- Developing countries face disproportionate adjustment costs
- Sectoral impacts vary significantly based on trade integration

Quick Start

```bash
# Clone repository
git clone https://github.com/Karcen/CBAM-Analysis.git
cd CBAM-Analysis

# Set up environment
conda env create -f environment.yml
conda activate cbam-analysis

# Run main analysis
python src/analysis/baseline_analysis.py
```

Data

The analysis uses data from:
- **Eora26 MRIO Database**: Global supply chain data
- **UN Comtrade**: Bilateral trade flows
- **Global Carbon Project**: Emissions factors

Due to size constraints, raw data is not included. See
`data/README.md` for download instructions.

Methodology

We extend the standard Leontief Input-Output model to incorporate:

1. Carbon intensity coefficients by sector and country
2. Border adjustment mechanisms with varying coverage
3. Supply chain adaptation through substitution elasticities

Mathematical framework:
```
X = (I - A)^(-1) * Y
E = F * X
```
Where X is gross output, A is the technical coefficient matrix,
Y is final demand, and F is the emission intensity vector.

Results

Main Findings

![Carbon Leakage Rates](results/figures/carbon_leakage.png)

Table 1: Sectoral Impacts of CBAM

Sector	Carbon Leakage (%)	Output Change (%)	Trade Diversion
Steel	23.4	-12.3	High
Cement	18.7	-8.9	Medium
...	...	...	...

Citation

If you use this code in your research, please cite:

```bibtex
@article{khan2025cbam,
  title={The effectiveness of unilateral vs. multilateral carbon
        adjustment mechanisms},
  author={Khan, Jawad and Li, Yuan and Zheng, Jiacheng},
  journal={One Earth},
```

```
    year={2025},
    note={Forthcoming}
}
```

Contributing

Contributions are welcome! Please see `CONTRIBUTING.md` for
guidelines.

License

This project is licensed under the MIT License - see `LICENSE`
for details.

Contact

- **Author**: Jiacheng (Karcen) Zheng
- **Email**: karcenzheng@yeah.net
- **Website**: https://karcen.github.io

Acknowledgments

- Prof. xxx for supervision and guidance
- Institute of International Studies for computational resources
- Cambridge Sustainability Forum for feedback and recognition

Beyond individual repositories, your GitHub profile itself tells a story through the contribution graph, pinned repositories, and profile README. The contribution graph's green squares demonstrate consistent research activity. Pinning your best repositories ensures visitors see your strongest work first. A profile README can provide context about your research interests and current projects.

6.2   Academic Writing Platforms: Building Your Reputation

While GitHub showcases code, platforms like Zhihu, Medium, and academic blogs demonstrate your ability to communicate complex ideas clearly. My 1.8 million words on Zhihu didn't just document learning—they built reputation, attracted collaborators, and demonstrated deep engagement with research topics.

Research Notes Publishing Strategy

Zhihu
Technical
Chinese

Medium
Research
English

Personal Blog
Projects
Bilingual

Integrated Portfolio
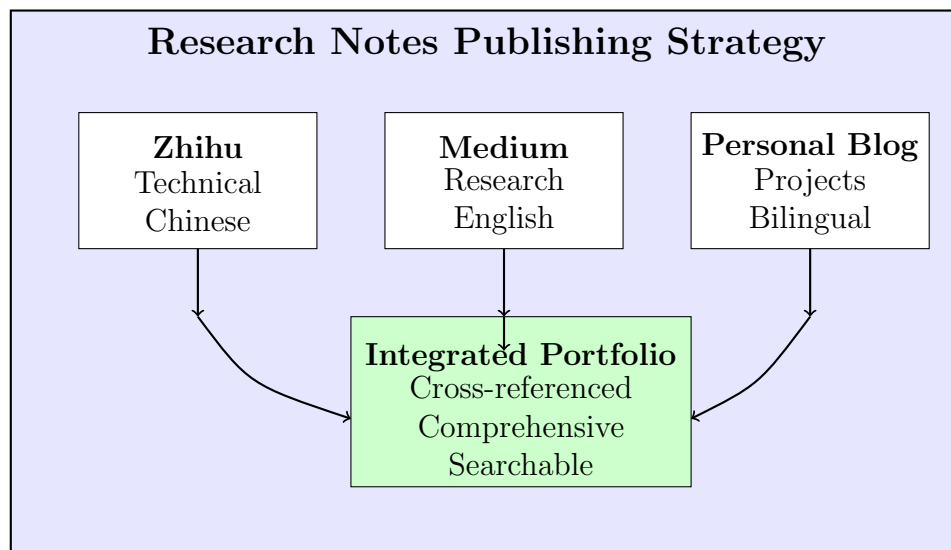Cross-referenced
Comprehensive
Searchable

Figure 6.2: Multi-platform strategy for building online academic presence

Writing for public platforms requires different skills than academic writing. The audience includes fellow students, researchers from other fields, and interested non-academics. This diversity demands clear explanation without sacrificing rigor. Here's an example of how I adapt complex research for public platforms:

Adapting Technical Content for Public Platforms

Academic Version:
"The Leontief inverse matrix $(I - A)^{-1}$ captures both direct and indirect production requirements, where the (i, j) element represents the total output of sector i needed to deliver one unit of final demand for sector j products."

Zhihu Version (with progressive complexity):
"Imagine the economy as a web where every industry depends on others. When you buy a car, you're not just buying from the auto industry—you're indirectly buying steel, rubber, electronics, and even accounting services that all con-

tributed to that car.

The Input-Output model captures these connections mathematically. Think of it like this: if we want to produce $1 million worth of cars, how much steel do we need? But wait—producing that steel requires iron ore and electricity. And producing electricity requires coal and machinery. And producing machinery requires more steel...

This creates an infinite loop that mathematicians solve using matrix algebra. The magical result—called the Leontief inverse—tells us the *total* requirements across the entire economy. For those interested in the math: we solve $(I - A)^{-1}$ where A represents direct requirements..."

Key Adaptations: - Start with intuitive analogy - Build complexity gradually - Provide concrete examples - Include technical details for interested readers - Use visualizations when possible

Part III

Comprehensive Examples and Templates

CHAPTER 7

Complete Application Package Examples

7.1 The Successful Application: A Full Case Study

Let me provide a complete application package that successfully gained admission to a top economics PhD program. This includes all components with annotations explaining strategic choices:

```
Complete Application Package - Cover Email

  Subject: PhD Application - Jiacheng Zheng - Shandong University


  Dear Professor Mitchell and Graduate Admissions Committee,


  I am submitting my application for the PhD program in Economics at
  your university for Fall 2026 admission. My application materials
  are complete in the online portal (Application ID: EC2026-4738).


  I am particularly excited about the possibility of joining your
  program because of its unique strength in computational methods
  and environmental economics, which aligns perfectly with my research
```

interests in analyzing climate policy impacts through global supply
chains.

My qualifications include:
- Top 10% ranking at Shandong University (985 institution)
- Two published papers (one as co-first author)
- Best Paper Award at Cambridge Sustainability Forum 2024
- Active collaboration with UCL Climate Economics team

I have arranged for three recommendation letters from:
- Professor xxx (Thesis Advisor) - submitted
- Professor xxx (UCL) - submitted
- Professor xxx (Co-author) - to be submitted by Nov 20

Please let me know if any additional materials are needed. Thank
you for considering my application.

Best regards,
Jiacheng (Karcen) Zheng

Writing Sample - Executive Summary Page

```
================================================================================
            WRITING SAMPLE FOR PHD APPLICATION
================================================================================


Title: Unintended Consequences of Carbon Border Adjustments:
        Evidence from Multi-Regional Input-Output Analysis


Author: Jiacheng Zheng


This writing sample is excerpted from my paper that won the Best
Paper Award at the 2024 Cambridge Sustainability Forum. I have
included the introduction, methodology section, and key results
(15 pages total) to demonstrate my research and writing abilities.
```

```
EXECUTIVE SUMMARY OF FULL PAPER
-------------------------------
Research Question:
Do carbon border adjustment mechanisms reduce global emissions or
merely redistribute them across countries?


Key Innovation:
We develop a dynamic Input-Output model that allows supply chains
to adapt endogenously to climate policies, revealing adaptation
patterns missed by static analyses.


Main Findings:
1. Static models underestimate carbon leakage by 15-20%
2. Supply chain adaptation varies by sector: high-tech adapts
   through substitution, heavy industry through relocation
3. Optimal border adjustment rates are 40-60% below domestic
   carbon prices when accounting for adaptation


Policy Implications:
Current CBAM design may increase global emissions by pushing
production to less efficient producers. Graduated implementation
with sector-specific rates could improve effectiveness.


Why This Sample:
This paper demonstrates my ability to:
- Integrate economic theory with computational methods
- Handle large datasets (2.3TB of trade data)
- Translate complex analysis into policy recommendations
- Collaborate internationally (co-authors from 3 countries)


[Followed by 15 pages of the actual paper...]
=====================================================================================
```

7.2 LaTeX Templates for Every Document Type

Here are production-ready LaTeX templates for common application documents:

```
LaTeX Template - Academic CV

\documentclass[11pt,a4paper]{article}
\usepackage[margin=0.75in]{geometry}
\usepackage{enumitem}
\usepackage{hyperref}
\usepackage{titlesec}
\usepackage{xcolor}

% Define colors
\definecolor{darkblue}{RGB}{26,13,171}

% Section formatting
\titleformat{\section}
{\color{darkblue}\normalfont\Large\bfseries}
{\color{darkblue}\thesection}{1em}{}
[\color{darkblue}\titlerule]

\titleformat{\subsection}
{\normalfont\large\bfseries}
{\thesubsection}{1em}{}

% Remove page numbers
\pagestyle{empty}

% Custom commands
\newcommand{\entry}[4]{
    \noindent\textbf{#1} \hfill #2\\
    \textit{#3}\\
    #4
    \vspace{0.2cm}
}
```

```
\begin{document}

% Header
\begin{center}
    {\Huge\textbf{Your Name}}\\[0.2cm]
    \href{mailto:email@university.edu}{email@university.edu} •
    (+1) 234-567-8900 •
    \href{https://yourwebsite.com}{yourwebsite.com}\\
    Address Line 1, City, State ZIP
\end{center}

\section{Education}

\entry{University Name}{Location}{
    Degree, Major, Expected Graduation Date
}{
    • GPA: X.X/4.0 (Ranking: X/XXX)\\
    • Relevant Coursework: Course 1, Course 2, Course 3\\
    • Thesis: ``Title of Your Thesis'' (Advisor: Prof. Name)
}

\section{Publications}

\subsection{Peer-Reviewed Articles}

\begin{enumerate}[leftmargin=*,label={[\arabic*]}]
    \item \textbf{Your Name}, Coauthor. (2025). ``Paper Title.''
    \textit{Journal Name}, Volume(Issue), pp. XX-XX.
\end{enumerate}

\subsection{Working Papers}

\begin{enumerate}[leftmargin=*,label={[\arabic*]},resume]
    \item \textbf{Your Name}, Coauthor. ``Paper Title.''
    Under Review at \textit{Journal Name}.
```

```
\end{enumerate}


\section{Research Experience}


\entry{Position Title}{Date Range}{
    Institution Name, Department
}{
    • Accomplished specific task with quantifiable result\\
    • Developed tool/method that improved process by X\%\\
    • Contributed to publication/presentation at venue
}


\section{Technical Skills}


\noindent\textbf{Programming:} Python (Advanced), R (Advanced),
MATLAB (Intermediate)\\
\textbf{Software:} LaTeX, Git, Docker, Stata, QGIS\\
\textbf{Languages:} English (Fluent), Other (Proficiency)


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CHAPTER 8

Conclusion: Your Journey Begins

8.1 Final Thoughts and Encouragement

As I complete this comprehensive guide, I reflect on the transformation from a student who failed calculus to someone preparing for graduate study at world-class institutions. This journey taught me that academic success is not predetermined by initial circumstances but shaped by strategic effort, persistent learning, and authentic engagement with scholarly communities.

> **The Ten Commandments of Graduate School Applications**
>
> 1. **Start Early:** Begin preparation at least 18 months before applications are due. Research experience, relationships with professors, and strong test scores cannot be developed overnight.
>
> 2. **Quality Over Quantity:** Better to apply to 8 programs with tailored, excellent applications than 20 programs with generic materials.
>
> 3. **Build Real Relationships:** Professors are people, not recommendation letter machines. Engage with their research genuinely.
>
> 4. **Document Everything:** Your GitHub commits, research notes, and project logs become evidence of your development as a scholar.

5. **Master the Fundamentals:** Mathematics, writing, and programming are not just requirements but tools for thought. Excel in them.

6. **Embrace Rejection:** Every successful academic has faced numerous rejections. They are data points for improvement, not judgments of worth.

7. **Develop Your Voice:** Authenticity resonates more than perfect credentials. Your unique perspective is your greatest asset.

8. **Think Beyond Admission:** Graduate school is a means, not an end. Keep sight of the research questions that drive you.

9. **Maintain Balance:** Academic success without physical and mental health is unsustainable. Build habits that support long-term excellence.

10. **Give Back:** As you progress, help others navigate the path. The academic community thrives through mutual support.

8.2   Resources for Continued Learning

Your journey doesn't end with reading this book. Here are essential resources for continued development:

8.3   A Personal Message

Dear Reader,

If you've reached this point, you've demonstrated the persistence that predicts success in academia. The path ahead is challenging but rewarding for those genuinely called to scholarly life.

Remember that behind every impressive CV is a story of struggle, failure, and gradual improvement. My own journey included failing courses, facing rejection from dream programs, and questioning whether I belonged in academia. These challenges, rather than disqualifying me, became the foundation for resilience and growth.

Your background—whether from a top university or unknown institution, whether with perfect grades or past struggles—provides unique perspectives valuable to academic discourse. The key is not hiding perceived weaknesses but transforming them into strengths through strategic development and authentic presentation.

The templates, examples, and strategies in this book are tools, not prescriptions. Adapt them to your circumstances, your field, and your goals. The best applications are not copies of successful templates but authentic expressions of genuine scholarly potential.

As you embark on your graduate school journey, remember that admission is just the beginning. The real goal is developing the knowledge, skills, and networks to make meaningful contributions to human understanding. Whether studying economics, computer science, or any other field, your work has the potential to improve lives and advance knowledge.

I hope this book serves not just as a practical guide but as encouragement that success is possible regardless of your starting point. With strategic effort, persistent dedication, and authentic engagement, you can achieve your academic ambitions.

May your journey be filled with discovery, growth, and contribution. The academic community needs diverse voices, fresh perspectives, and passionate scholars. We need you.

Veritatem sequi—Pursue the truth, wherever it may lead.

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Better Work, Better Future

Table 8.1: Essential Resources for Graduate School Preparation

Category	Resource	Description
Mathematics	MIT OpenCourse-Ware	Complete courses from calculus through graduate analysis
	3Blue1Brown	Visual intuition for mathematical concepts
	Terence Tao's Blog	Deep insights from Fields Medalist
Programming	Coursera/edX	Structured courses in Python, R, machine learning
	Stack Overflow	Community support for coding problems
	GitHub Learning Lab	Interactive tutorials for version control
Economics	NBER Working Papers	Cutting-edge research freely available
	EconTalk Podcast	Accessible discussions of economic ideas
	QuantEcon	Computational economics with Python/Julia
Writing	Purdue OWL	Comprehensive writing guidance
	They Say/I Say	Templates for academic arguments
	Style: Lessons in Clarity	Classic guide to clear writing
Applications	GradCafe Forums	Crowd-sourced admission results
	Reddit r/gradadmissions	Community support and advice
	Faculty websites	Direct source for research interests

APPENDIX A

Quick Reference Guides

A.1 Application Timeline Checklist

Months Before	Tasks
18-24	Begin research experience, identify target programs
15-18	Develop relationships with potential recommenders
12-15	Take standardized tests (GRE/TOEFL/IELTS)
9-12	Research faculty at target schools, draft initial SOP
6-9	Request recommendations, finalize school list
3-6	Complete applications, revise essays multiple times
0-3	Submit applications, send thank you notes

A.2 Email Templates for Common Situations

```
Following Up on Research Opportunity

 Subject: Follow-up: Research Assistant Position - [Your Name]


 Dear Professor [Name],
```

I wanted to follow up on my email from [date] regarding research opportunities in your lab. I understand you receive many requests and may have missed my initial message.

Since writing, I have:
- Completed [relevant coursework/project]
- Read your recent paper on [specific topic]
- Developed [relevant skill]

I remain very interested in contributing to your research on [specific area]. I'm particularly intrigued by [specific aspect of their work].

I've attached an updated CV reflecting my recent activities. Would you have 15 minutes in the coming weeks to discuss potential opportunities?

Thank you for your time.

Best regards,
[Your Name]