Trade Integration and the Fragility of Trade Relationships

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Introduction

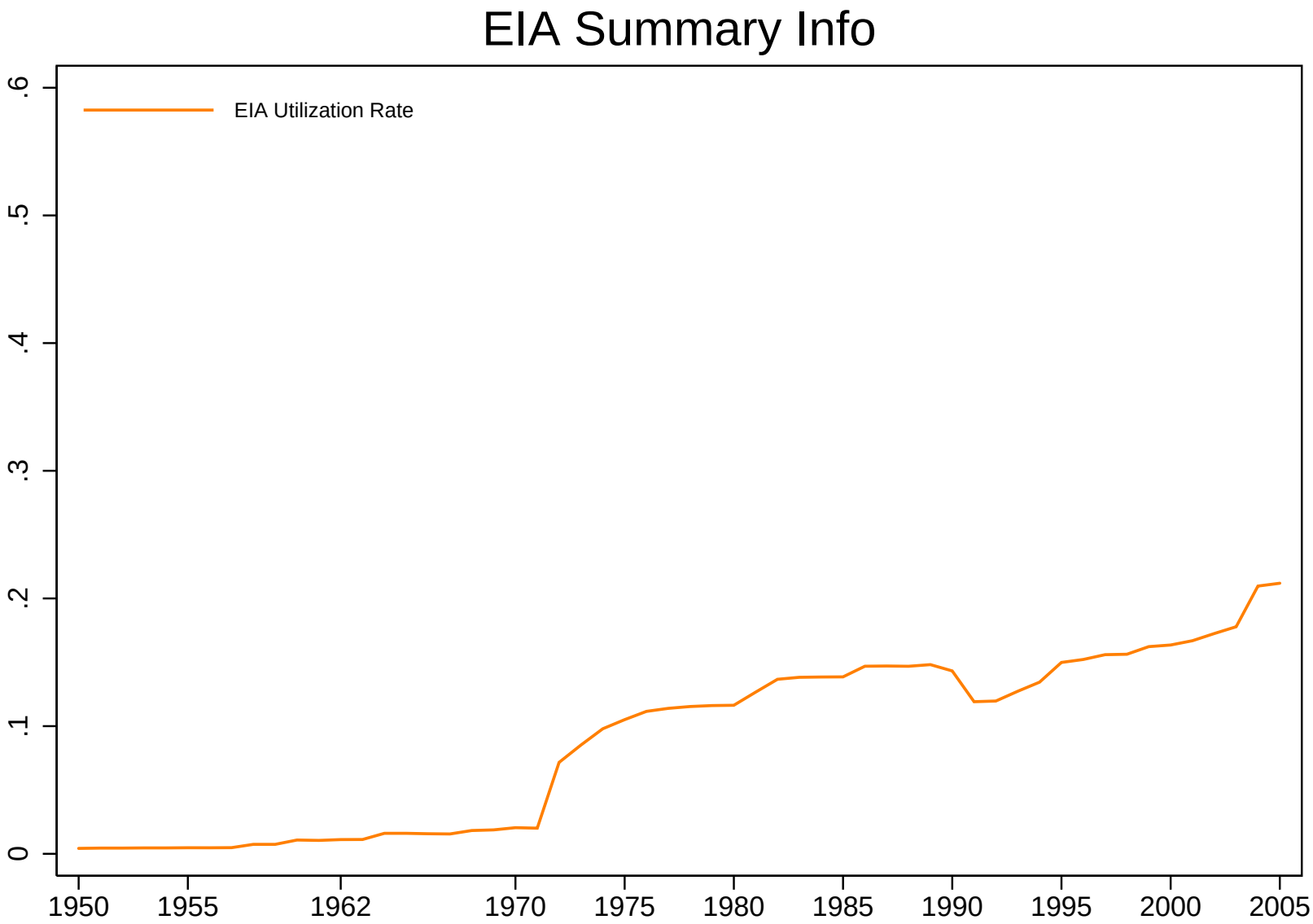
- Trade agreements = Economic integration agreements (EIAs)
- What are EIAs?
  - trade agreements outside the WTO's multilateral system
  - violate the WTO's cardinal principle of non–discrimination
- The number of various trade agreements has increased steadily
- What is their impact on the product–level patterns of trade?

Growth of EIAs

Visualization by Tristan Kohl, University of Groningen

`http://www.tristankohl.org/web/Research.html`

Bilateral Utilization of Agreements



Literature on Trade Agreements

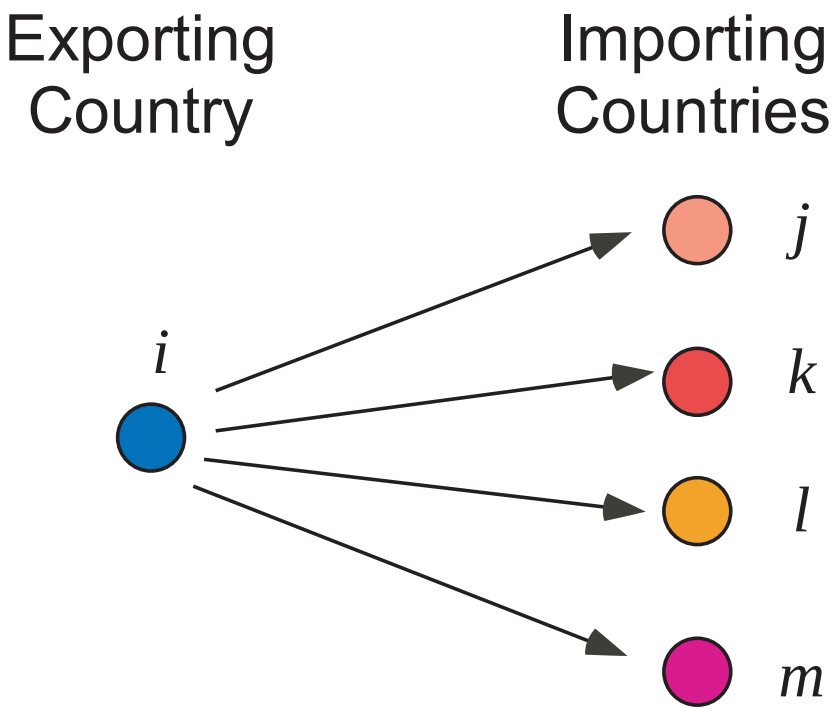
- Much work has been done on understanding why countries sign trade agreements
  - Chen and Joshi (2012), Baldwin and Jaimovich (2012), Bergstrand, Egger, and Larch (2013)
- Much work has been done on understanding the effects of trade agreements on aggregate trade
  - Frankel (1997), Carrère (2006), Baier and Bergstrand (2007), Magee (2008), Baier, Bergstrand, and Feng (2011), Kohl (2012)
- What about the effects at a disaggregated level?
  - Anderson and Yotov (2011)

Our Questions

- What are the effects at the level of a trade relationship?
  - exporter–importer–product triplet
- We focus on an active trade relationship or spell of trade
  - consecutive years when a trade relationship is active
- What is the effect on:
  - duration of trade (the length of the spell)
  - growth of trade within a spell
  - initial volume of trade of a spell

What is a relationship?

Relationship: country *i* selling *x* to country *j*



What is a spell?

Spell: Continuous years of service

	1980	81	82	83	84	85	86	87
Chile			X	X	X			
U.S.				X	X	X	X	
Argentina		X	X	X	X	X	X	

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Duration of a relationship

	Year-by-Year				
	1982	1983	1984	1985	Overall
Chile	1	2	3		3
U.S.		1	2	3	4
Argentina	2	3	4	5	6

Literature

- Duration of trade
  - Besedeš and Prusa (2006a, 2006b), Besedeš 2008, Nitsch (2009)
  - Jaud, Kukenova, and Strieborny (2009), Besedeš and Prusa (2011), Carrère and Strauss-Khan (2012)
  - Görg, Kneller, and Muraközy (2012), Cadot, Iacovone, Rauch, and Pierola (2012)
  - Hess and Person (2011)
  - Besedeš and Prusa (2013)
- Growth of trade
  - Araujo, Mion, and Ornelas (2011), Besedeš, Kim, and Lugovskyy (2013)
- Initial volume
  - Besedeš and Prusa (2006b), Besedeš (2008)

Duration of Trade and Trade Agreements

- Few papers on the effect of trade agreements at a disaggregated level
- Besedeš (forthcoming) shows NAFTA had a differential effect on the duration of exports of member countries
  - limited in scope – only one trade agreement
- Kamuganga (2012) shows regional trade cooperation in Africa increases duration exports
  - limited in county coverage (Africa only), time coverage (1995-2009), and methodology (Cox PH, single agreement dummy)

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  - *reduces* the initial volume of trade relationship starting *after* the agreement
- Timing of agreements is important to understanding their effects

Motivating Model

- Nguyen (2012)
- Two innovations
  1. a firm's sales are imperfectly correlated across destinations
     - a firm faces perceived quality draws that are firm–destination specific
     - firms enter foreign markets sequentially, if at all
  2. a firm faces an uncertain foreign demand
     - uncertainty is resolved only *after* the firm exports to a particular market
     - a firm may earn negative profit forcing it to exit $\Rightarrow$ export failure

Motivating Model

- A firm produces a variety of a differentiated product selling it in a monopolistically competitive market
- Faces two costs
  1. fixed cost
     - store front, advertising, fixed shipping and port fees
  2. marginal cost
     - variable production and trade costs, including transportation and tariff related costs

Motivating Model

- The profit the firm earns in a destination depends on
  - the perceived quality of its variety ($+$)
  - total spending on differentiated goods ($+$)
  - fixed costs ($-$)
  - marginal costs ($-$)
  - the endogenous level of competition ($-$)
  - the elasticity of substitution between the varieties ($-$)
- The perceived quality is unknown to the firm before it exports to a given market
- The firm forms an ex–ante expectation of the profit
- If the ex–post profit is negative, the firm exits the market

Motivating Model

- A firm can make two decisions vis–à–vis a market
  1. if it already serves a market, whether to continue doing so
     - depends on fixed and marginal costs, the level of competition, and the size of the market
     - any decrease in fixed and marginal costs reduces the likelihood of an exit
  2. whether to begin exporting to a market to test it
     - the value of testing the market depends on the likelihood of staying in the market
     - as the likelihood of staying increases, so does the value of testing
     - a reduction in fixed and marginal costs increases the likelihood of testing a market
- Trade agreements reduce both fixed and marginal costs

Implications

- Active trade relationships
  - increase the likelihood of staying in the market – reduction in the hazard
  - increase in the volume of exports
- New trade relationships
  - products not traded prior to the agreement
  - become feasible due to reduction in costs
  - marginal relationships due to low perceived quality
  - reduction in costs increases testing, but the test itself may fail
  - on average, can expect such relationships to exhibit lower initial volumes, larger hazard rates, and lower growth rates
  - should observe increased entry rates

Data

- Trade flow data
  - 5–digit SITC data annually between 1962 and 2011
  - source: UN Commtrade
  - all importer data as reported
- Agreements
  - Database on Economic Integration Agreements
  - compiled by Scott Baier and Jeffrey Bergstrand (2007)
  - various EIAs as entered into by the 195 countries in the sample between 1950 and 2005
- CEPII gravity data
  - GDP, distance, common border, common language

Six Types of Agreements

1. Non–reciprocal Preferential Trade Agreements
2. Preferential Trade Agreements
3. Free Trade Agreements
4. Customs Unions
5. Common Markets
6. Economic Unions

Data Summary

- 29,671,095 observations on trade flows between 1962 and 2005
- No EIA information for 2,021,121 observations (7%)

Type of agreement	Number of observations	Number of observations used in estimation
None	16,990,281	15,237,989
NR–PTA	2,468,555	2,389,726
PTA	1,459,940	1,418,321
FTA	3,736,467	3,274,454
Customs Union	1,404,939	907,092
Common Market	1,122,545	906,884
Economic Union	465,962	375,559
Total	27,649,671	24,510,480

- We do not distinguish between different EIA types

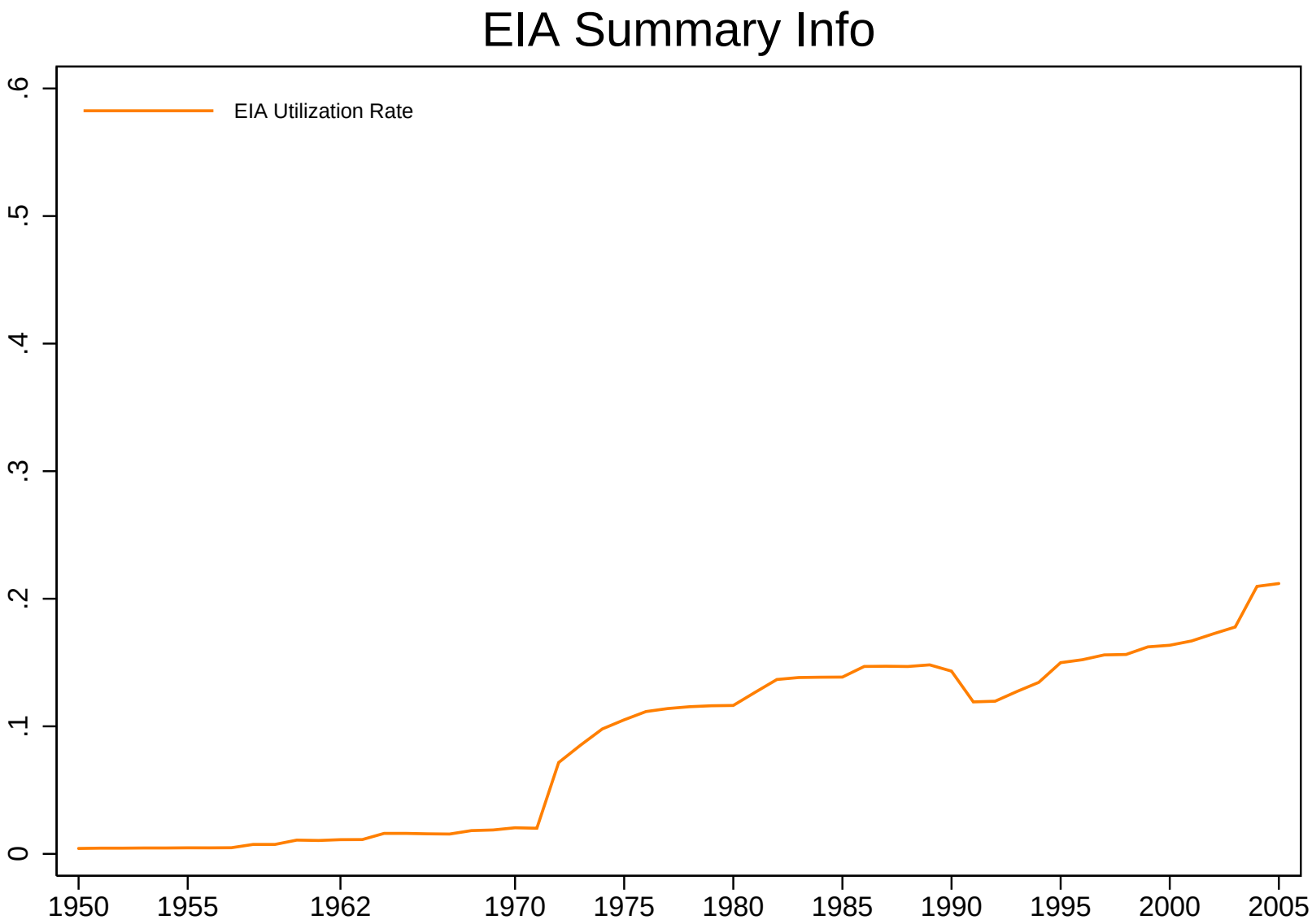
Data Summary

- 3,109,559 trade relationships
- 7,191,964 active spells of service (2.3 per relationship)
- 45% of relationships are single–spell relationships
- 22% of relationships are two–spell relationships
- Less than 7% have six or more active spells

Distribution of Spell Length

Spell length	Number of spells	Fraction of spells
1	4,009,321	55.7%
2	1,109,540	15.4%
3	507,534	7.1%
4	294,258	4.1%
5	213,270	3.0%
6	174,633	2.4%
7	115,726	1.6%
8	99,488	1.4%
9	80,455	1.1%
10	80,313	1.1%
11-20	327,288	4.6%
21-30	82,061	1.1%
31-43	98,077	1.4%
Total	7,191,964	100.0%

EIA Data Coverage



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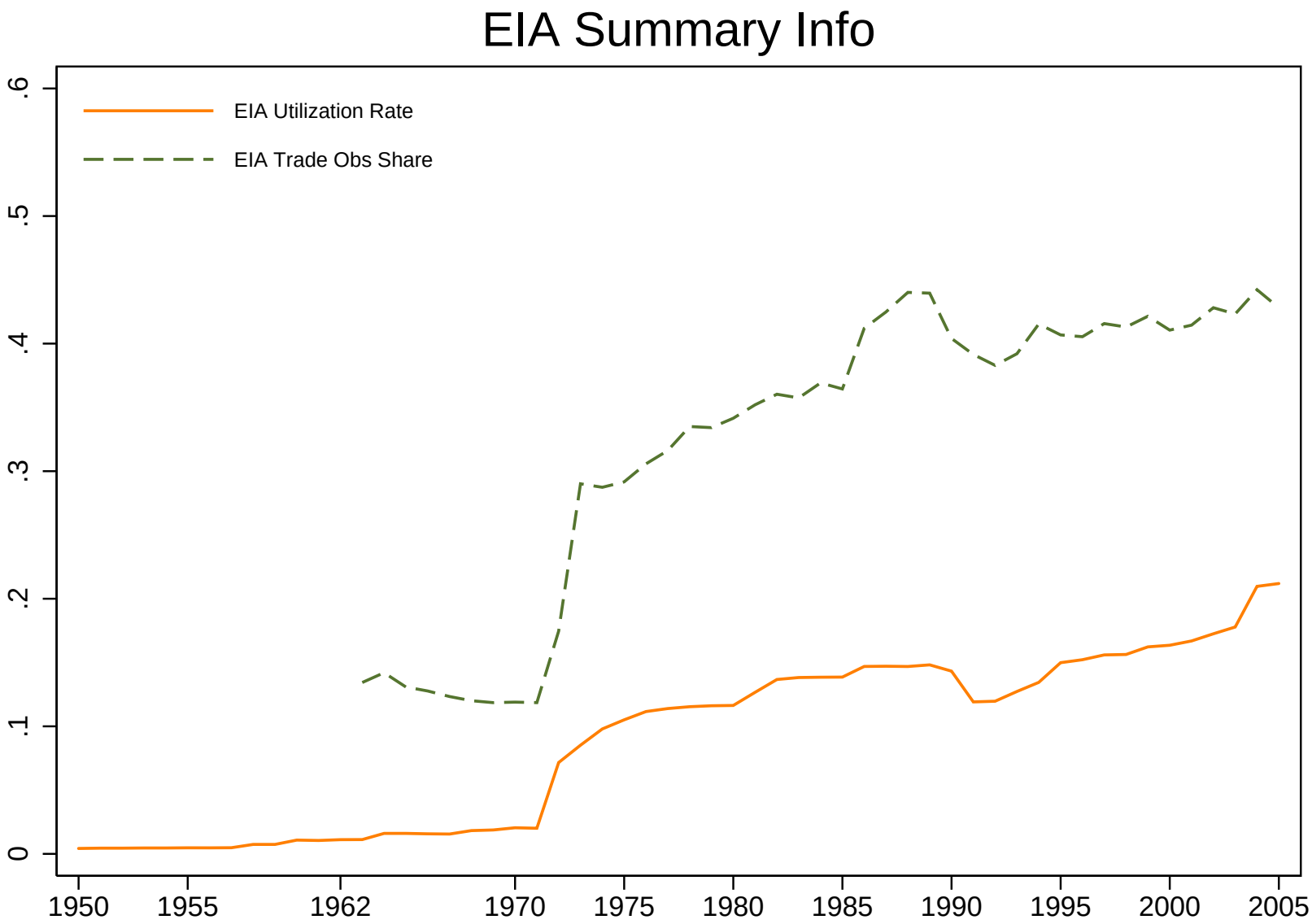

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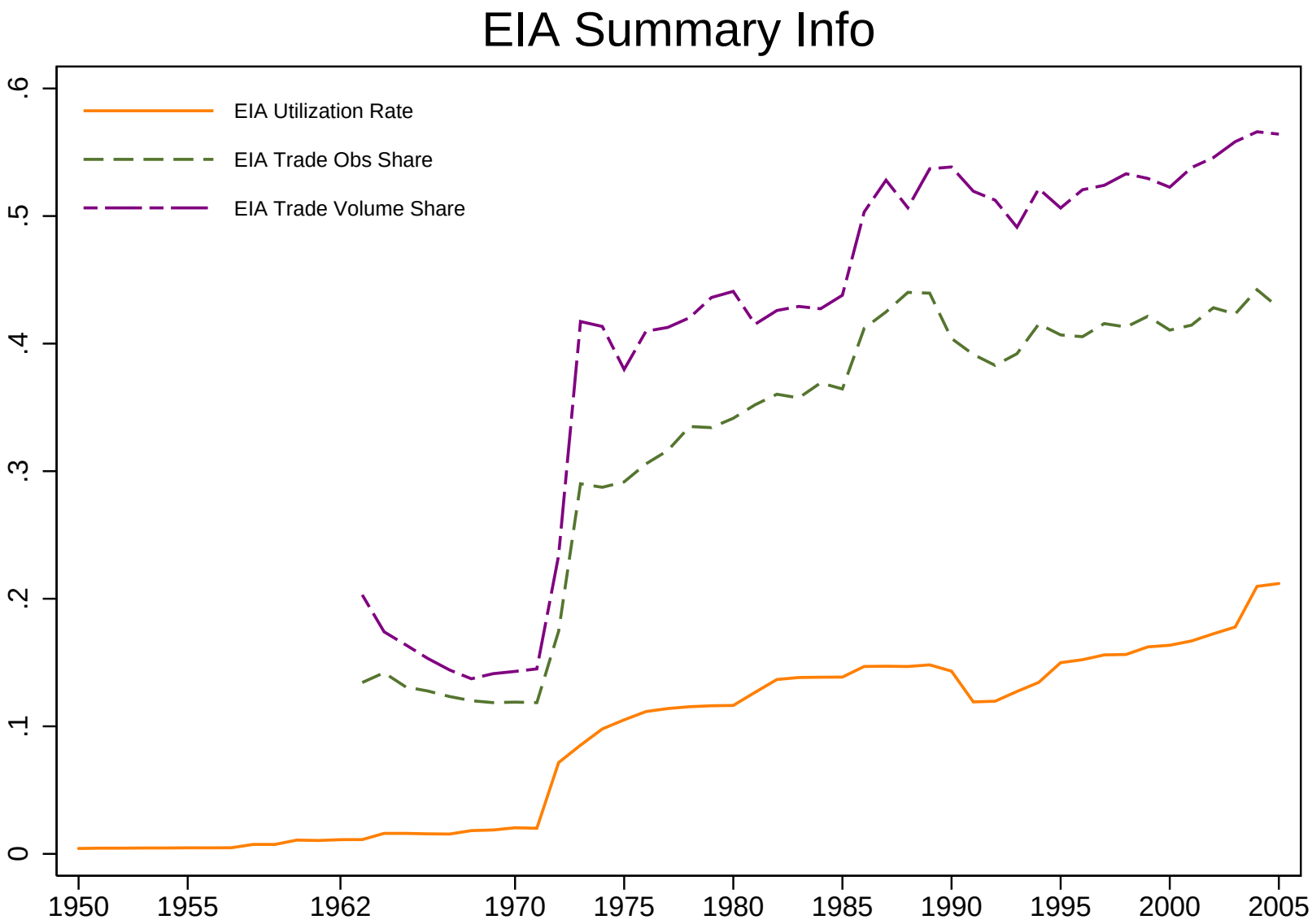
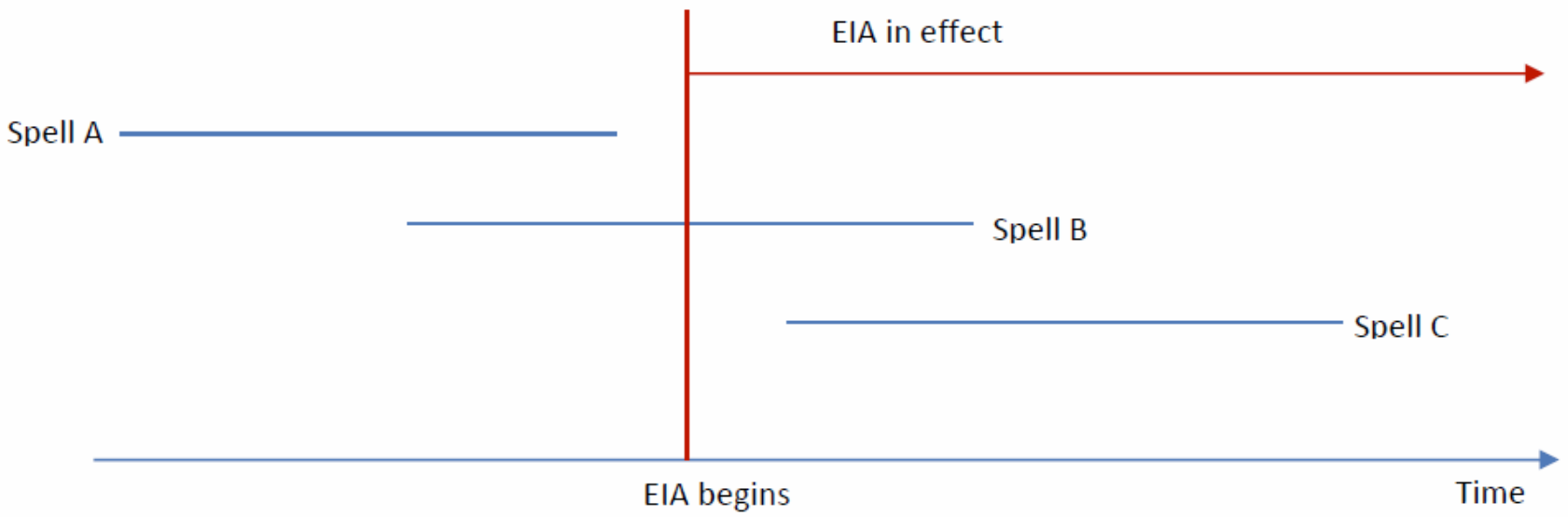


Identifying the EIA Effect(s)



Identifying the EIA Effect(s)

Four variables identifying EIAs

- EIA exists
  - identifies pairs of countries that ever share an agreement
- EIA in effect
  - identifies years when agreement is actually in effect

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- EIA in effect
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- Spell starts after EIA
  - identifies spells which started in the wake of EIA
- Duration of EIA
  - how long the EIA has been in place

Methodology

- Estimate the hazard using random effects probit
- Estimate growth and initial volume regressions using OLS
- The effect of each covariate is determined by comparing the estimated hazard fitted at different values of the covariate along with the 99^{th} percentile confidence interval
- Assume the following about the timing of the agreement
  - the agreement starts in the sixth year of an active spell
  - a spell starting after the agreement, starts in the sixth year of the agreement

Hazard of Trade Ceasing Results

	(1)	(2)	(3)
Duration (ln)	-0.514***		
Initial imports (ln)	-0.081***		
Importer GDP (ln)	-0.009***		
Exporter GDP (ln)	-0.080***		
Distance (ln)	0.105***		
Contiguity	-0.123***		
Common language	0.014***		
EIA exists	-0.103***		
EIA in effect	0.048***		
Constant	0.978***		
Observations	24,510,480		
Number of relationships	3,109,593		
Log-Likelihood	-10,354,031		
ρ	0.166***		

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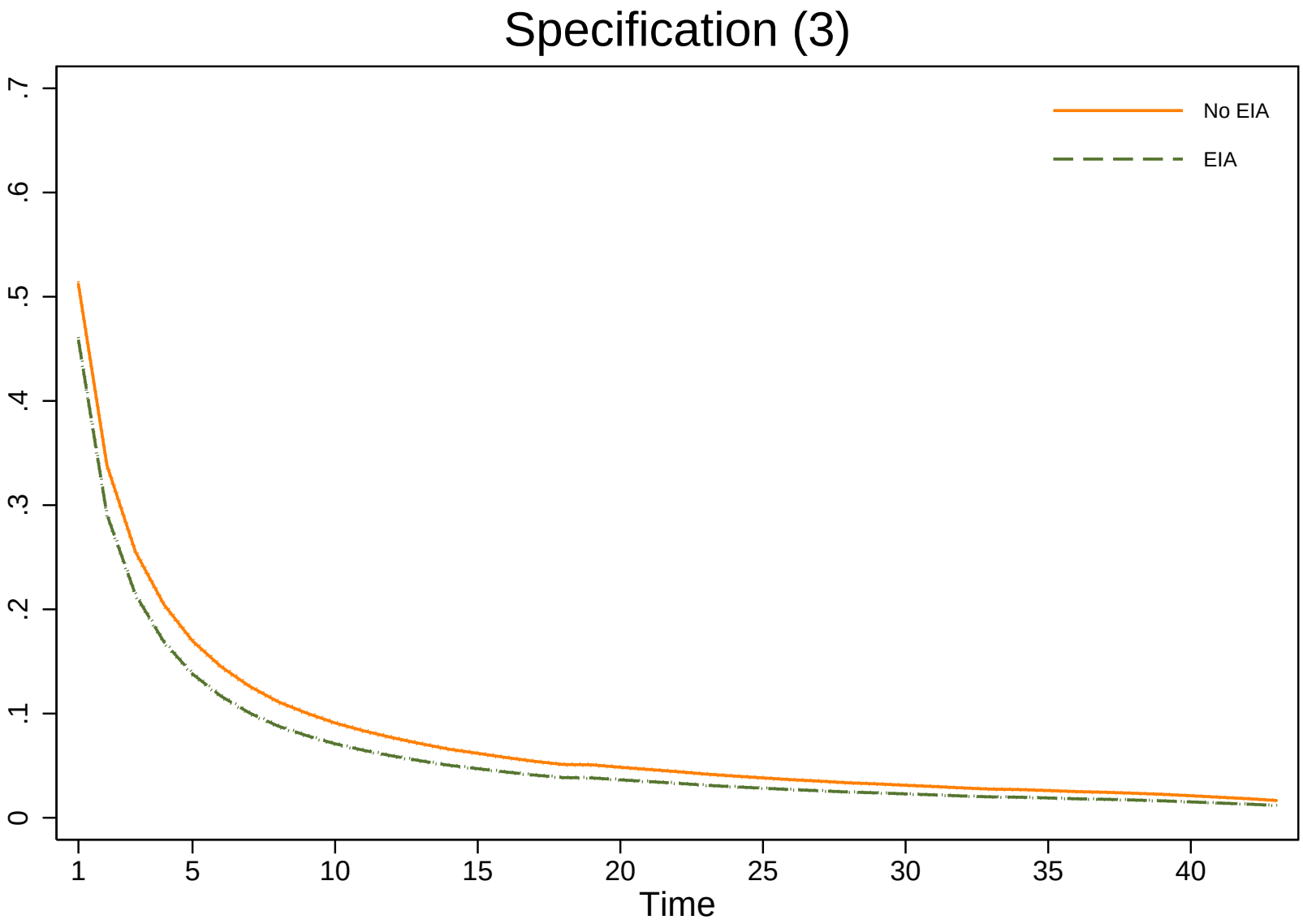
Magnitude of Effects

- How large are these effects?
- Examine the fitted hazard across the three specifications
- Look at
  - differences between country pairs with and without an agreement
  - effect of EIA on active spells
  - effect of EIA on post–agreement–started spells
- Comparison benchmark – pairs of countries without an EIA

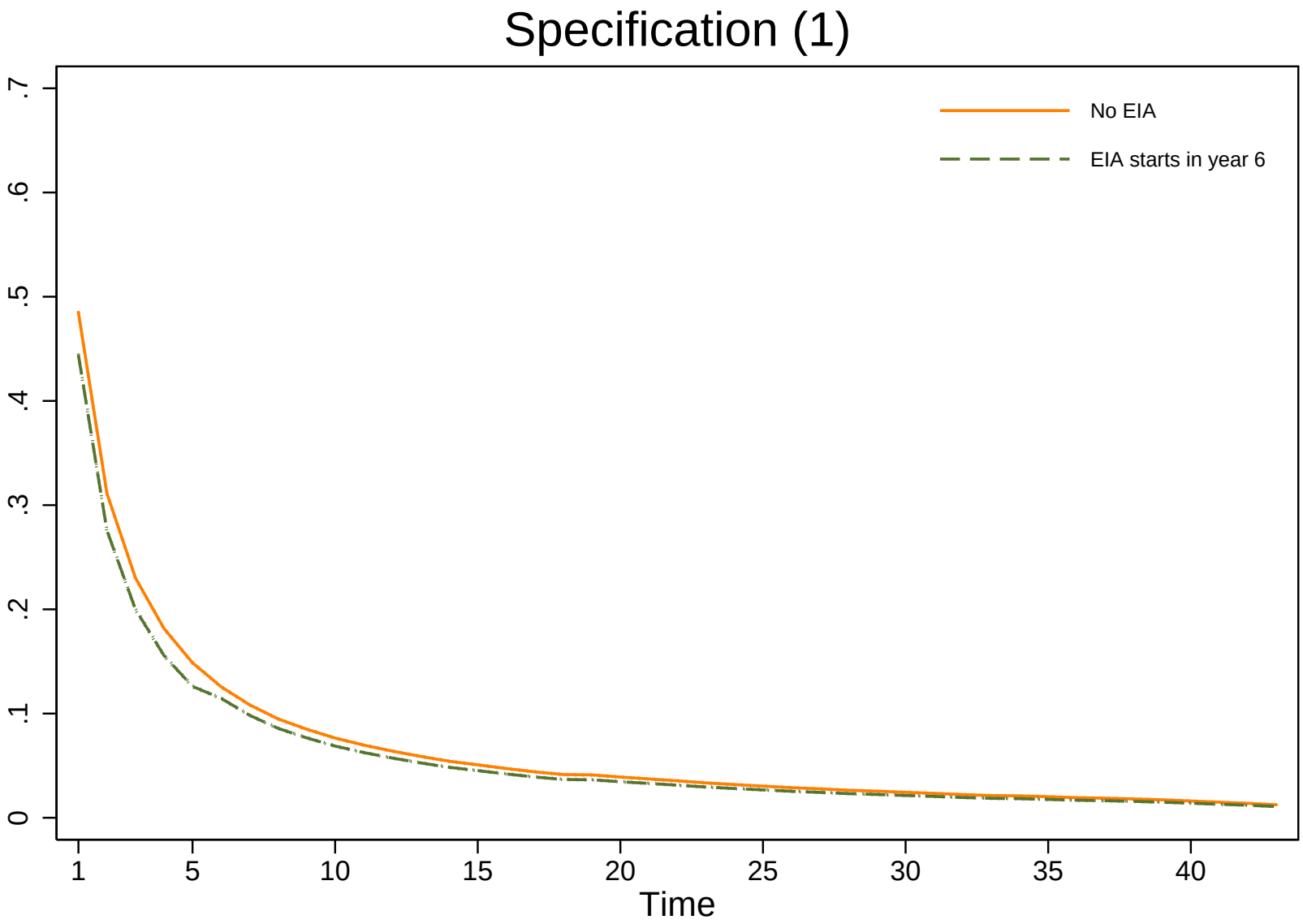
Countries With and Without EIA



Magnitude of EIA Exists Effect

- Countries with an EIA have a a 1.5 percentage points lower hazard under specification (3)
- Under specification (3) the difference averages
  - year 1 – 5.3 percentage points (10% of the hazard faced by countries without an agreement)
  - years 2-5 – 3.9 percentage points
  - years 25 and over – less than 1 percentage point
  - across all 43 years 24% of the hazard faced by countries without an agreement

Effect on Active Spells



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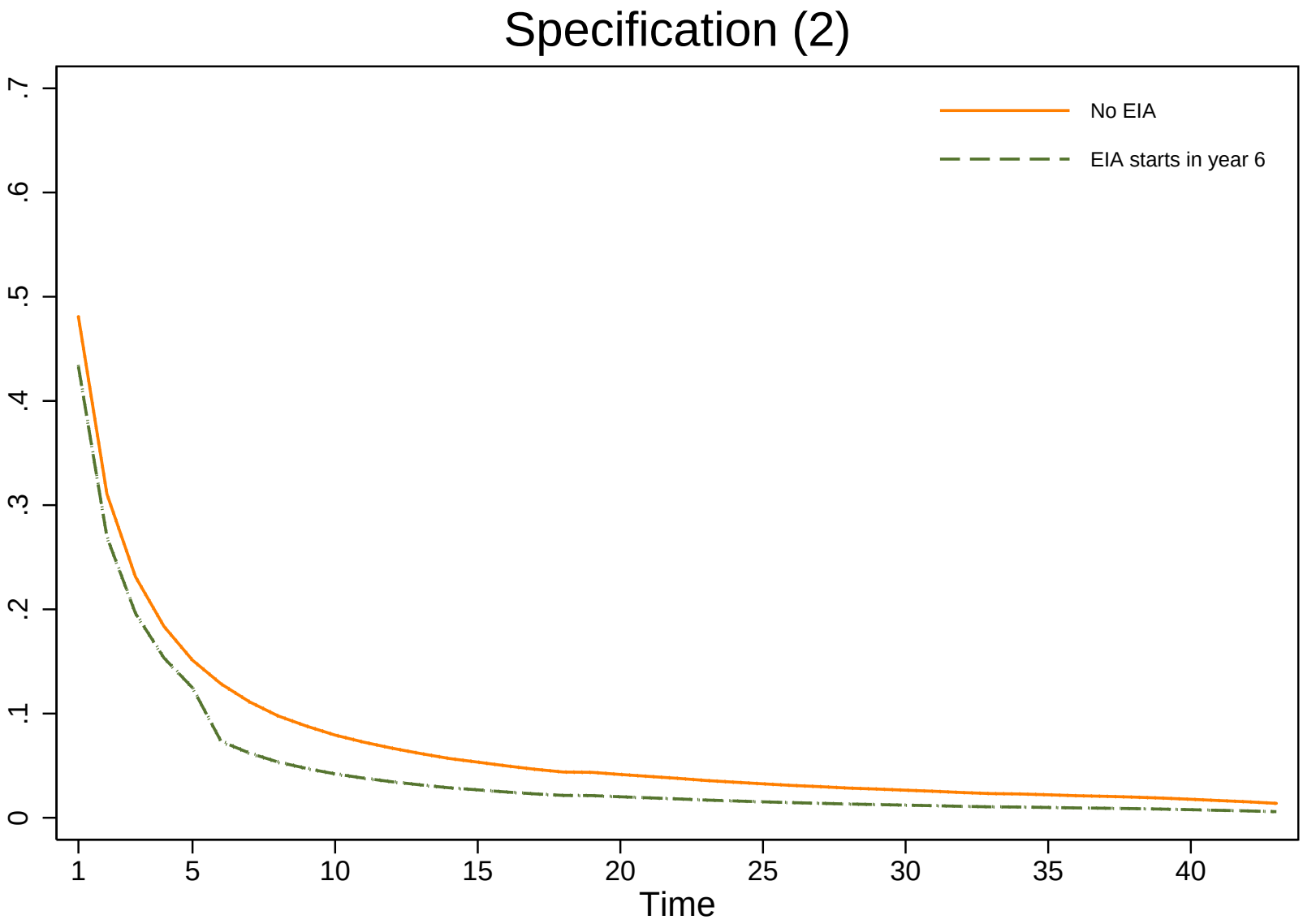

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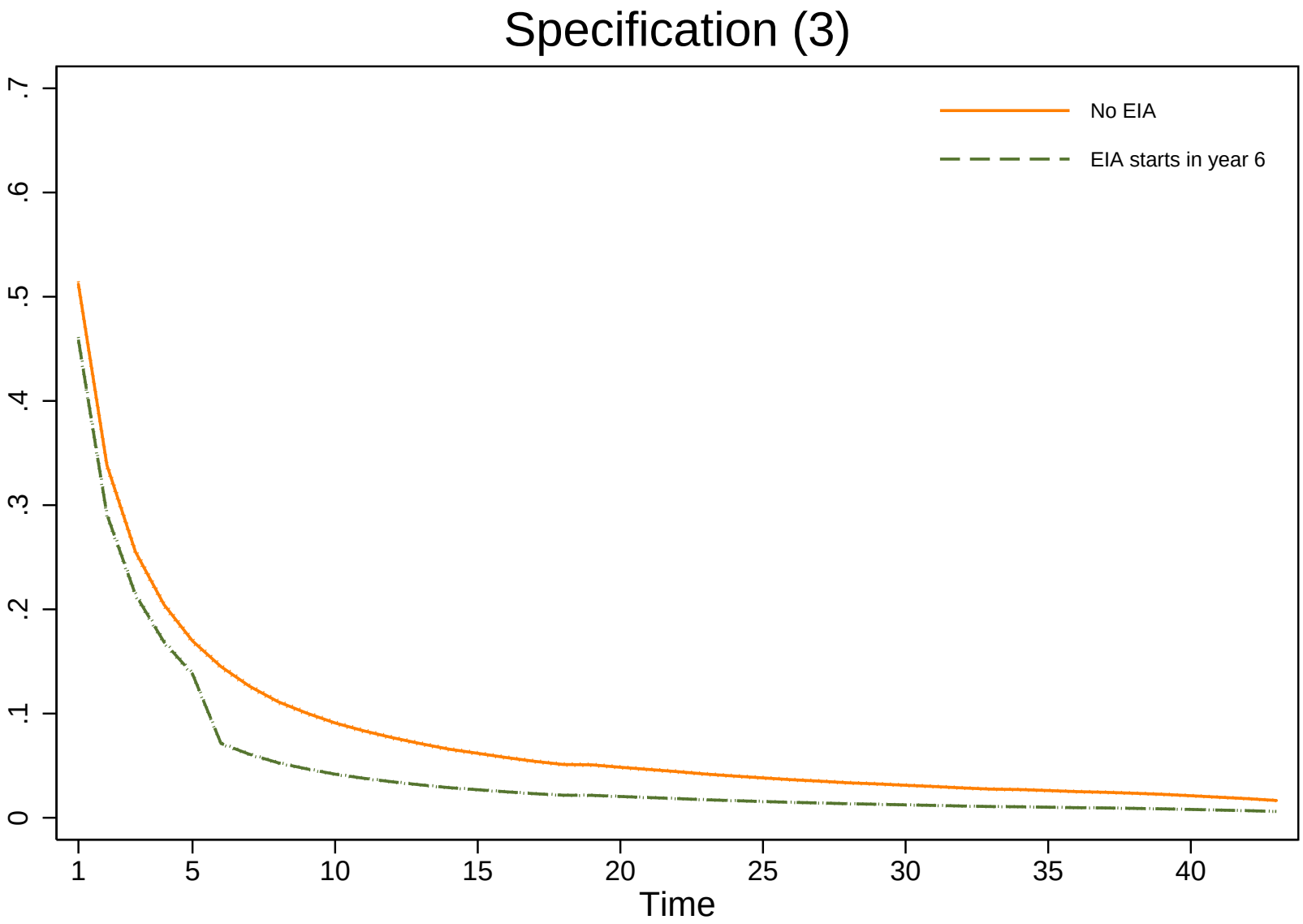
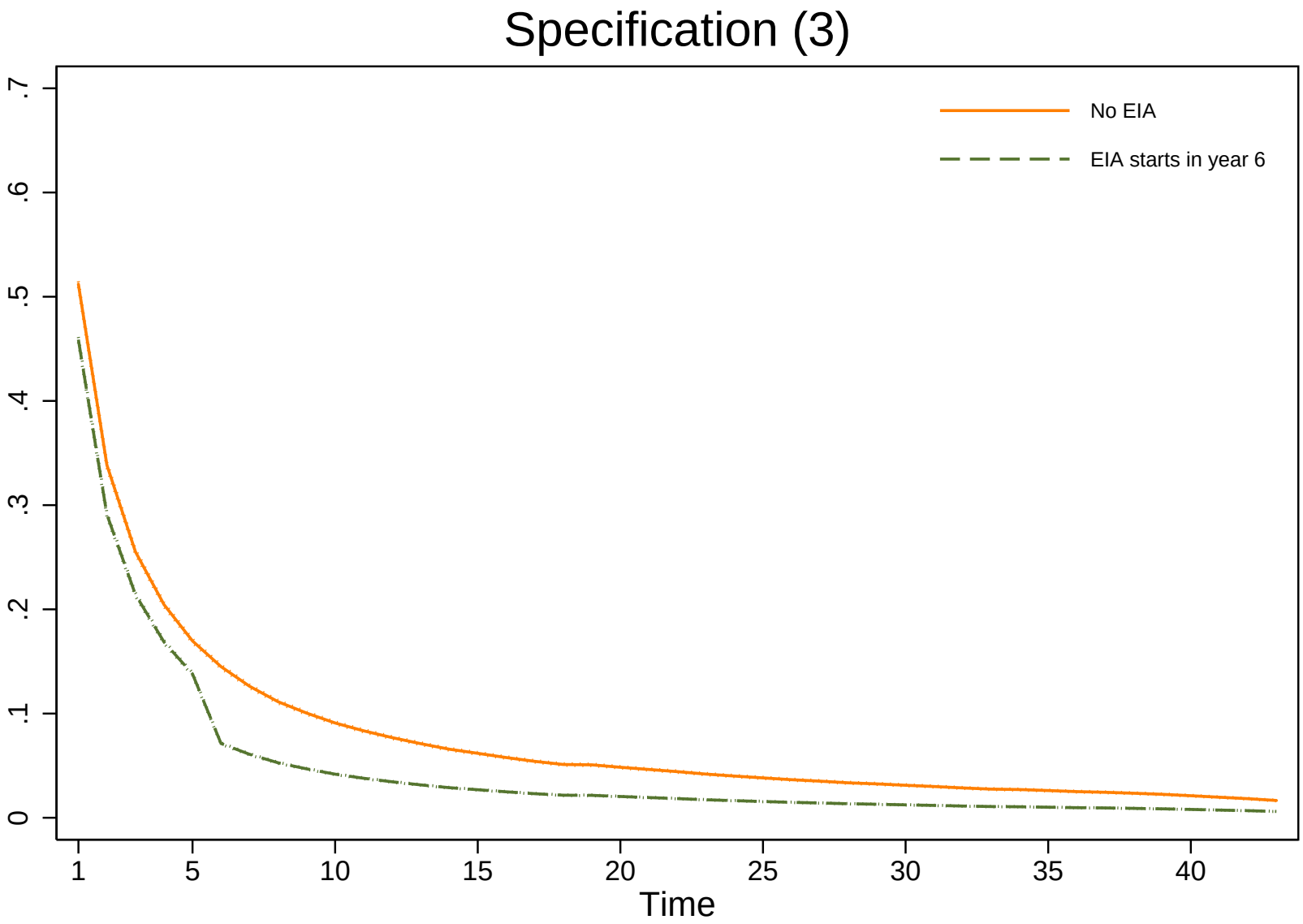


Magnitude of the Effect on Active Spells

- Under specification (1) the onset of EIA increases the hazard slightly (less than 1 perc point)
- Under specification (3)
  - in year 6, the EIA reduces the hazard by 4.5 perc points
    - 40% lower hazard than would be faced in the absence of EIA
    - 31% lower hazard relative to a pair of countries without an agreement
  - the average annual reduction is 1.6 perc points
    - 45% of the hazard for countries with an agreement
    - 33% of the hazard for countries without an agreement

Spells Started after EIA



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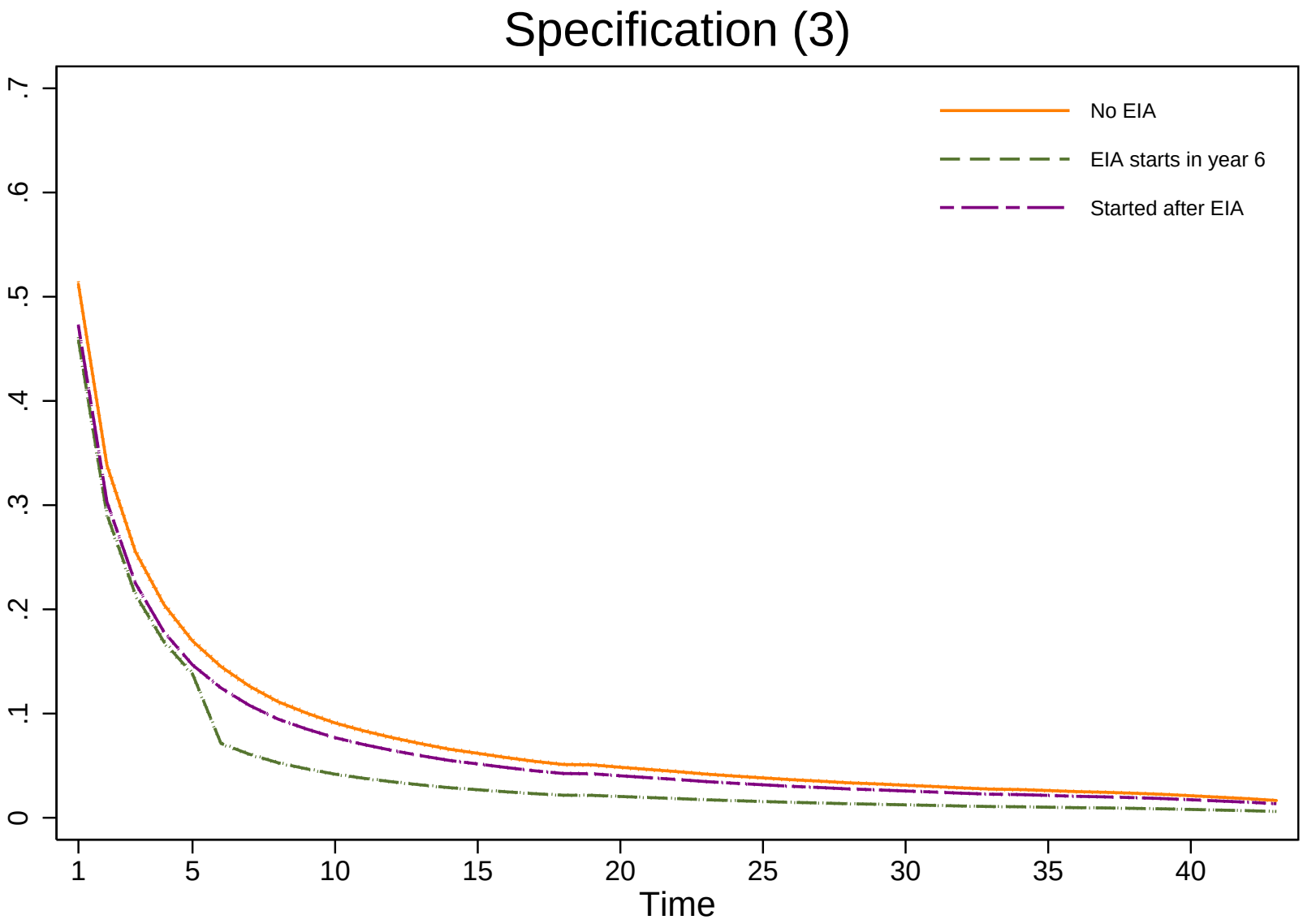


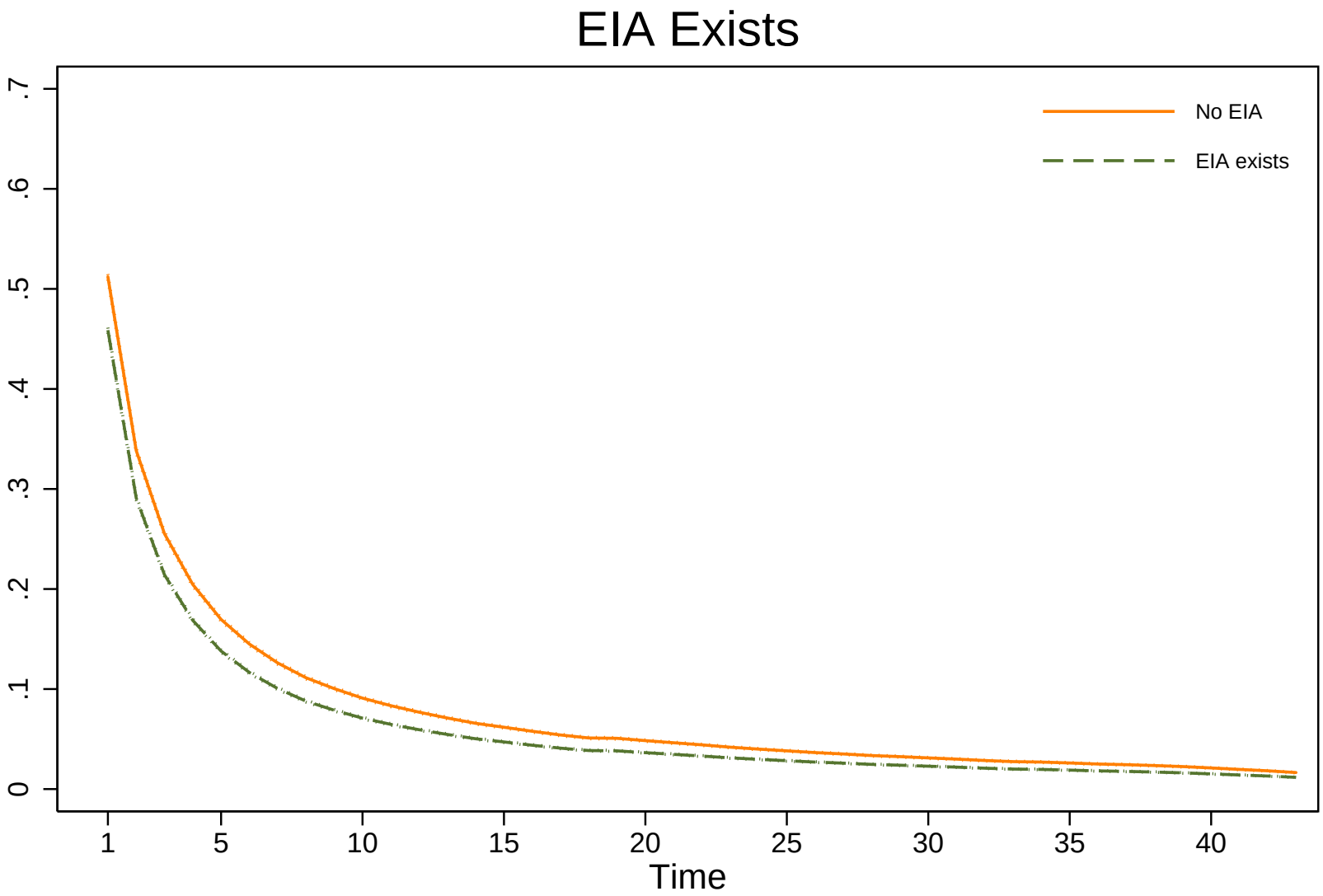
Magnitude of the Effect on Active Spells

- Over the first five years, the hazard for spells started before the agreement is on average 1 perc point lower than that for spells started after the agreement
- But the agreement reduces the hazard for the former by 5.3 perc points
- The difference is on average a 55% lower hazard in every year

Pure Effects

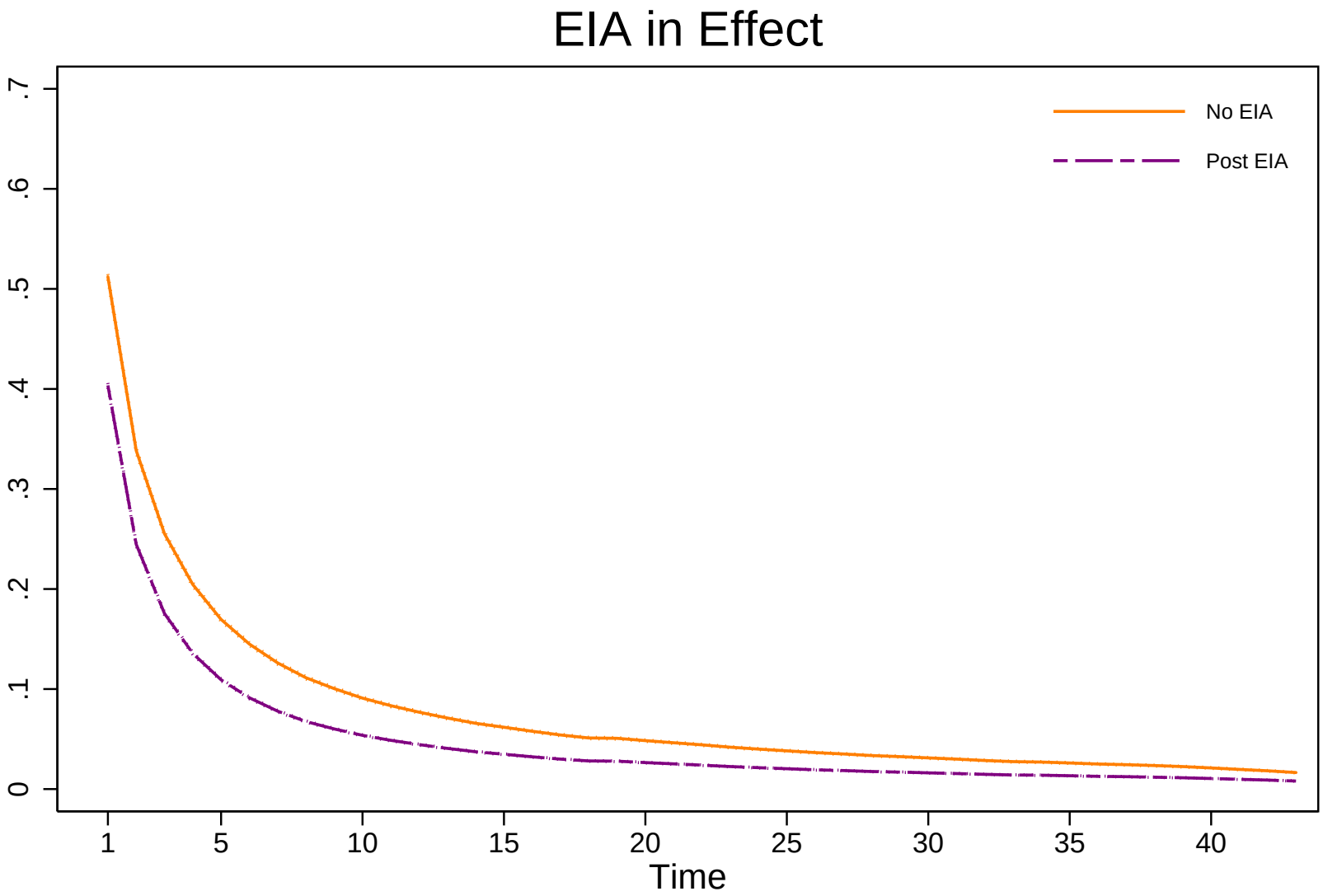
- EIA effects don't occur in isolation
- How large would they be if they did?

Pure Effect of EIA Exists



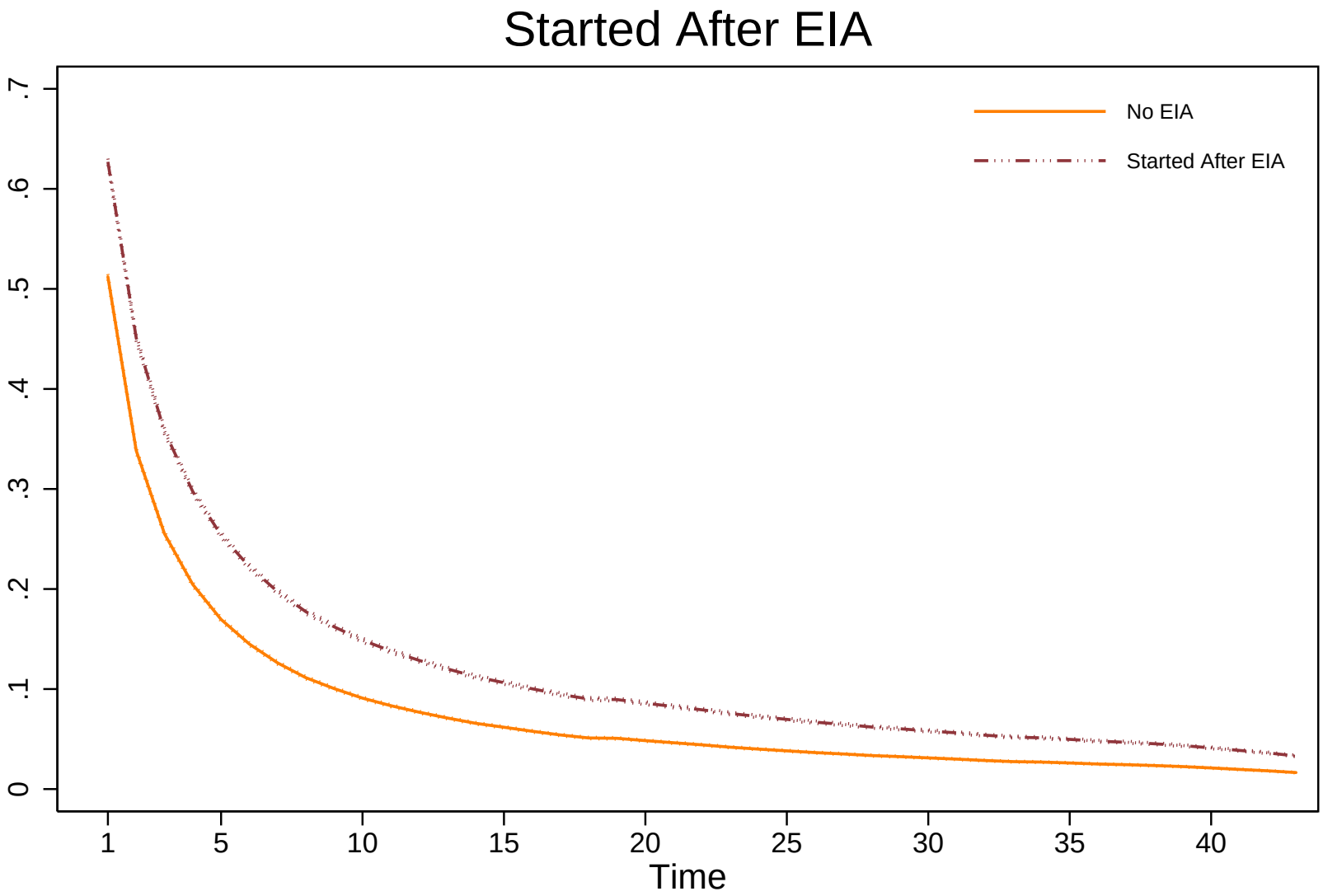
EIA Duration Specification

Pure Effect of EIA in Effect



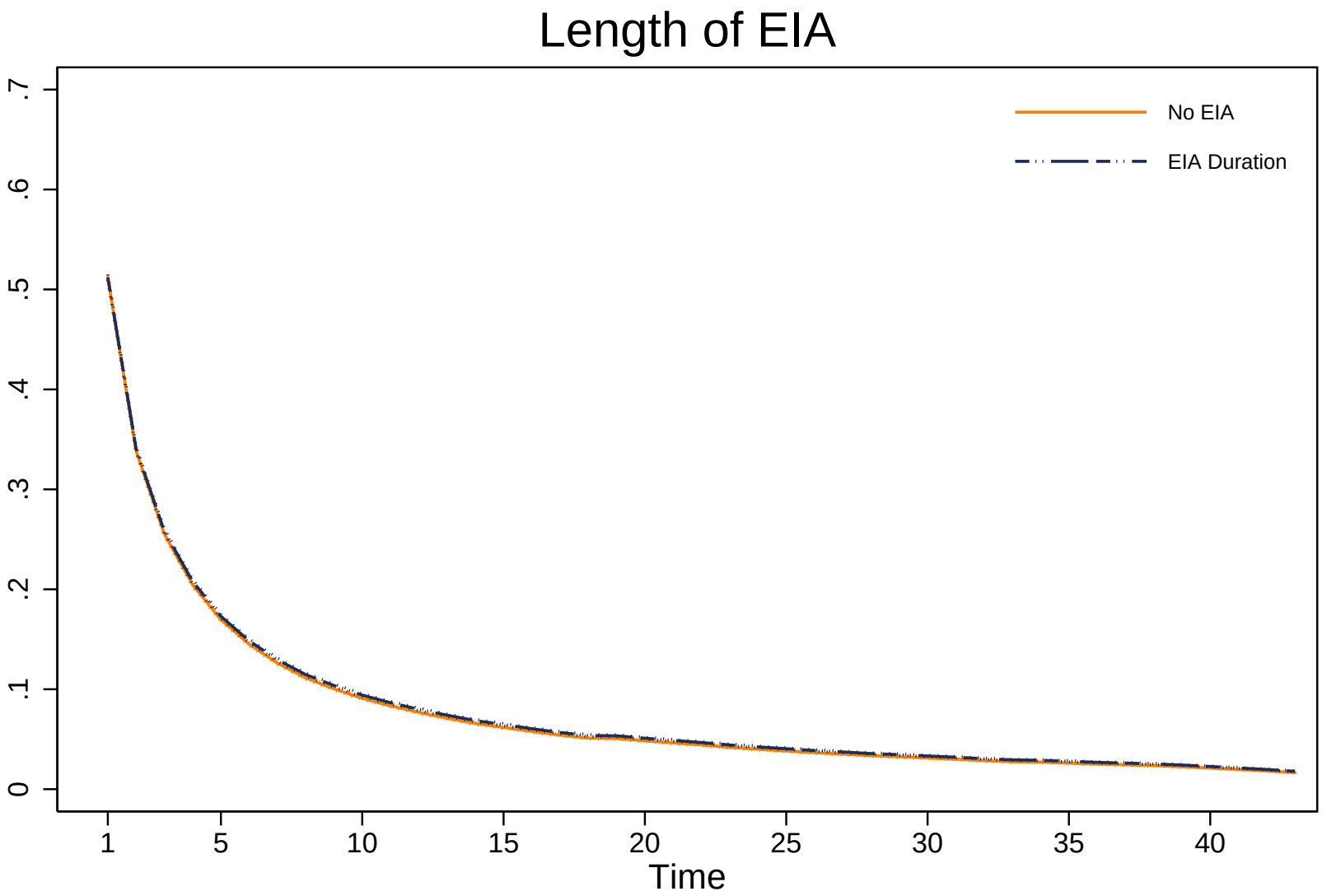
EIA Duration Specification

Pure Effect of Starting After EIA



EIA Duration Specification

Pure Effect of EIA Duration



EIA Duration Specification

Magnitudes of Pure Effects

- Pure effect of EIA exists
  - average of 24% lower hazard
- Pure effect of EIA in effect
  - average of 44% lower hazard
- Pure effect of EIA exists
  - average of 75% higher hazard
- Pure effect of EIA exists
  - average of 5% higher hazard

Growth of Trade

- What is the effect of EIA on the growth of the volume of trade within a spell?
- Use the same specification as with the hazard

Growth of Trade Results

	(1)	(2)	(3)
Duration (ln)	-0.267***		
Initial imports (ln)	-0.089***		
Importer GDP (ln)	0.024***		
Exporter GDP (ln)	0.015***		
Distance (ln)	-0.016***		
Contiguity	0.026***		
Common language	0.007***		
EIA exists	-0.006***		
EIA in effect	-0.008***		
Spell starts after EIA			
Duration of EIA (ln)			
Constant	0.505***		
Observations	17,335,923		
Relationships	1,840,903		
R^2	0.027		

Growth of Trade Results

	(1)	(2)	(3)
Duration (ln)	-0.267***	-0.269***	
Initial imports (ln)	-0.089***	-0.089***	
Importer GDP (ln)	0.024***	0.024***	
Exporter GDP (ln)	0.015***	0.015***	
Distance (ln)	-0.016***	-0.015***	
Contiguity	0.026***	0.027***	
Common language	0.007***	0.008***	
EIA exists	-0.006***		
EIA in effect	-0.008***		
Spell starts after EIA			
Duration of EIA (ln)			
Constant	0.505***	0.505***	
Observations	17,335,923	17,335,923	
Relationships	1,840,903	1,840,903	
R^2	0.027	0.027	

Growth of Trade Results

	(1)	(2)	(3)
Duration (ln)	-0.267***	-0.269***	
Initial imports (ln)	-0.089***	-0.089***	
Importer GDP (ln)	0.024***	0.024***	
Exporter GDP (ln)	0.015***	0.015***	
Distance (ln)	-0.016***	-0.015***	
Contiguity	0.026***	0.027***	
Common language	0.007***	0.008***	
EIA exists	-0.006***	-0.005***	
EIA in effect	-0.008***	0.017***	
Spell starts after EIA		-0.036***	
Duration of EIA (ln)			
Constant	0.505***	0.505***	
Observations	17,335,923	17,335,923	
Relationships	1,840,903	1,840,903	
R^2	0.027	0.027	

Growth of Trade Results

	(1)	(2)	(3)
Duration (ln)	-0.267***	-0.269***	-0.268***
Initial imports (ln)	-0.089***	-0.089***	-0.089***
Importer GDP (ln)	0.024***	0.024***	0.024***
Exporter GDP (ln)	0.015***	0.015***	0.015***
Distance (ln)	-0.016***	-0.015***	-0.015***
Contiguity	0.026***	0.027***	0.027***
Common language	0.007***	0.008***	0.008***
EIA exists	-0.006***	-0.005***	
EIA in effect	-0.008***	0.017***	
Spell starts after EIA		-0.036***	
Duration of EIA (ln)			
Constant	0.505***	0.505***	0.501***
Observations	17,335,923	17,335,923	17,335,923
Relationships	1,840,903	1,840,903	1,840,903
R^2	0.027	0.027	0.027

Growth of Trade Results

	(1)	(2)	(3)
Duration (ln)	-0.267***	-0.269***	-0.268***
Initial imports (ln)	-0.089***	-0.089***	-0.089***
Importer GDP (ln)	0.024***	0.024***	0.024***
Exporter GDP (ln)	0.015***	0.015***	0.015***
Distance (ln)	-0.016***	-0.015***	-0.015***
Contiguity	0.026***	0.027***	0.027***
Common language	0.007***	0.008***	0.008***
EIA exists	-0.006***	-0.005***	-0.003***
EIA in effect	-0.008***	0.017***	0.019***
Spell starts after EIA		-0.036***	-0.033***
Duration of EIA (ln)			-0.000***
Constant	0.505***	0.505***	0.501***
Observations	17,335,923	17,335,923	17,335,923
Relationships	1,840,903	1,840,903	1,840,903
R^2	0.027	0.027	0.027

Initial Volume

- What is the effect on the initial volume of trade?
- Regress the volume of trade in the first year of each spell
- Can’t use the same specification
- Using only one observation per spell
- ’EIA in effect’ identifies the difference between spells starting before and after the agreement

Initial Volume Results

	(1)	(2)
Importer GDP (ln)	0.163***	
Exporter GDP (ln)	0.102***	
Distance (ln)	-0.190***	
Contiguity	0.218***	
Common language	0.030***	
EIA exists	0.075***	
EIA in effect	-0.374***	
Duration of EIA (ln)		
Constant	7.260***	
Observations	7,174,557	
R^2	0.035	

Initial Volume Results

	(1)	(2)
Importer GDP (ln)	0.163***	0.170***
Exporter GDP (ln)	0.102***	0.103***
Distance (ln)	-0.190***	-0.176***
Contiguity	0.218***	0.233***
Common language	0.030***	0.058***
EIA exists	0.075***	0.121***
EIA in effect	-0.374***	-0.168***
Duration of EIA (ln)		-0.017***
Constant	7.260***	7.023***
Observations	7,174,557	7,174,557
R^2	0.035	0.038

Entry Rates

- The reduction of fixed and marginal costs increases the value from testing previously nonserviced markets
- Do trade agreements induce new entry?
- Look at entry rates and net entry rates

(Net) Entry Rates Results

	Entry rate		Net entry rate	
	(1)	(2)	(3)	(4)
Importer GDP (ln)	-0.019***	-0.017***	-0.001***	-0.001***
Exporter GDP (ln)	-0.027***	-0.026***	-0.004***	-0.004***
Distance (ln)	-0.040***	-0.037***	0.004***	0.004***
Contiguity	-0.198***	-0.194***	-0.003	-0.002
Common language	0.049**	0.054***	-0.014***	-0.013***
EIA exists	-0.114***	-0.090***	0.010***	0.014***
EIA in effect	-0.016	0.284***	-0.015***	0.043***
Duration of EIA (ln)		-0.028***		-0.005***
Constant	0.788***	0.461***	0.346***	0.283***
Observations	348,298	348,298	342,643	342,643
R^2	0.016	0.016	0.113	0.114

Robustness

- Use 6–digit HS data between 1989 and 2005 instead
- Substitute time with greater product detail
- The number of annual observations increases from 24,510,177 to 52,406,617
- No qualitative changes in results

6–digit HS Results

	1962-2005 SITC data			1989-2005 HS data		
	Hazard	Growth	Initial volume	Hazard	Growth	Initial volume
Duration (ln)	-0.501***			-0.443***		
Init vol (ln)	-0.081***			-0.097***		
Imp GDP (ln)	-0.011***			-0.036***		
Exp GDP (ln)	-0.080***			-0.138***		
Dist (ln)	0.099***			0.160***		
Contig	-0.124***			-0.128***		
Com lang	0.007***			-0.087***		
EIA exists	-0.154***			-0.047***		
EIA in effect	-0.276***			-0.383***		
Start after EIA	0.299***			0.214***		
Dur of EIA (ln)	0.008***			0.020***		
Constant	1.139***			1.854***		
Observations	24,510,177			52,406,617		
Relationships	3,109,559			11,831,067		
R^2						
ρ	0.164***			0.314***		

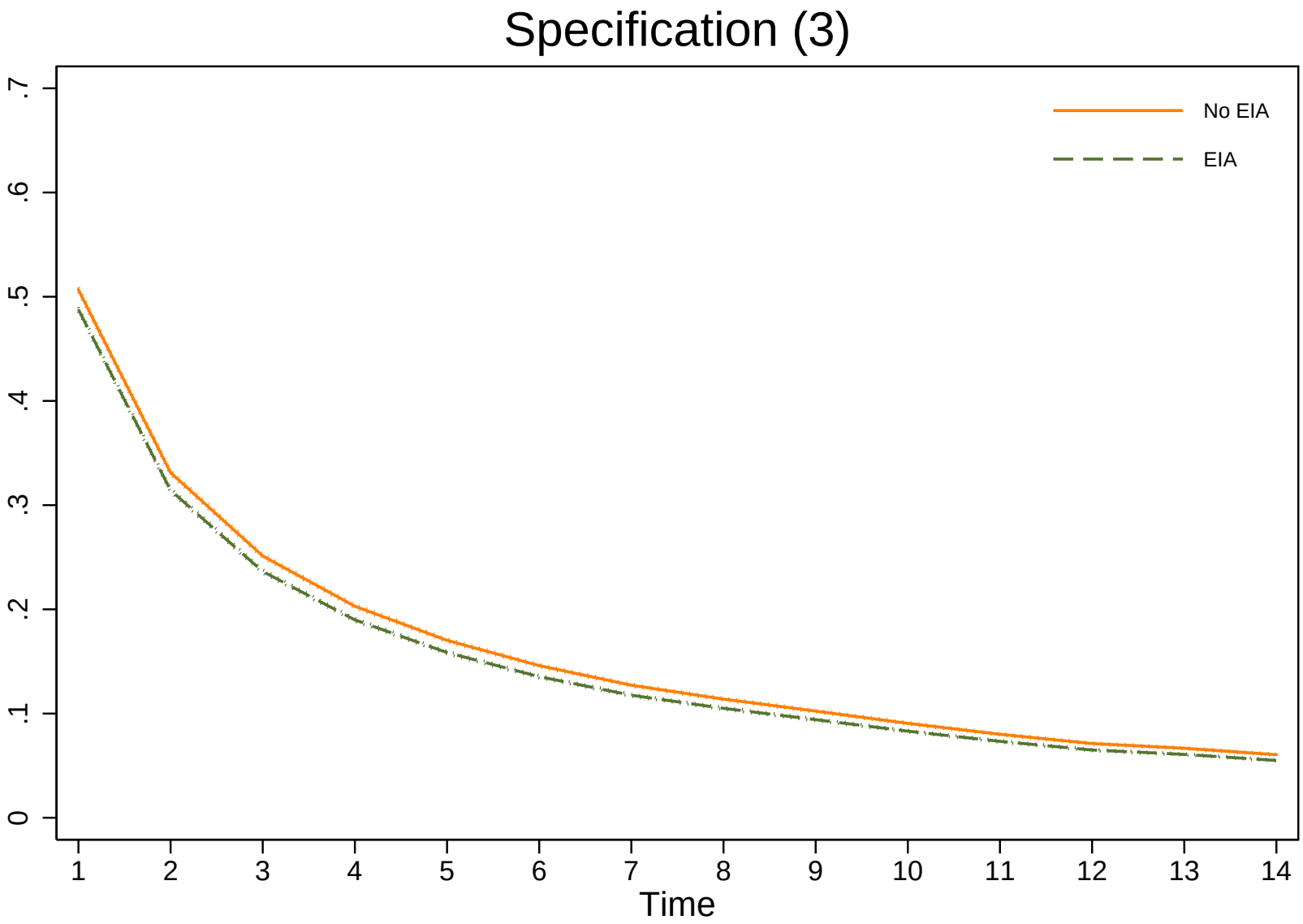
6–digit HS Results

	1962-2005 SITC data			1989-2005 HS data		
	Hazard	Growth	Initial volume	Hazard	Growth	Initial volume
Duration (ln)		-0.268***			-0.341***	
Init vol (ln)		-0.089***			-0.110***	
Imp GDP (ln)		0.024***			0.038***	
Exp GDP (ln)		0.015***			0.012***	
Dist (ln)		-0.015***			-0.016***	
Contig		0.027***			0.049***	
Com lang		0.008***			-0.011***	
EIA exists		-0.003***			-0.005***	
EIA in effect		0.019***			0.004***	
Start after EIA		-0.033***			-0.000	
Dur of EIA (ln)		-0.000***			-0.005***	
Constant		0.501***			0.816***	
Observations		17,335,923			24,517,509	
Relationships		1,840,903			5,037,710	
R^2		0.027			0.032	
ρ						

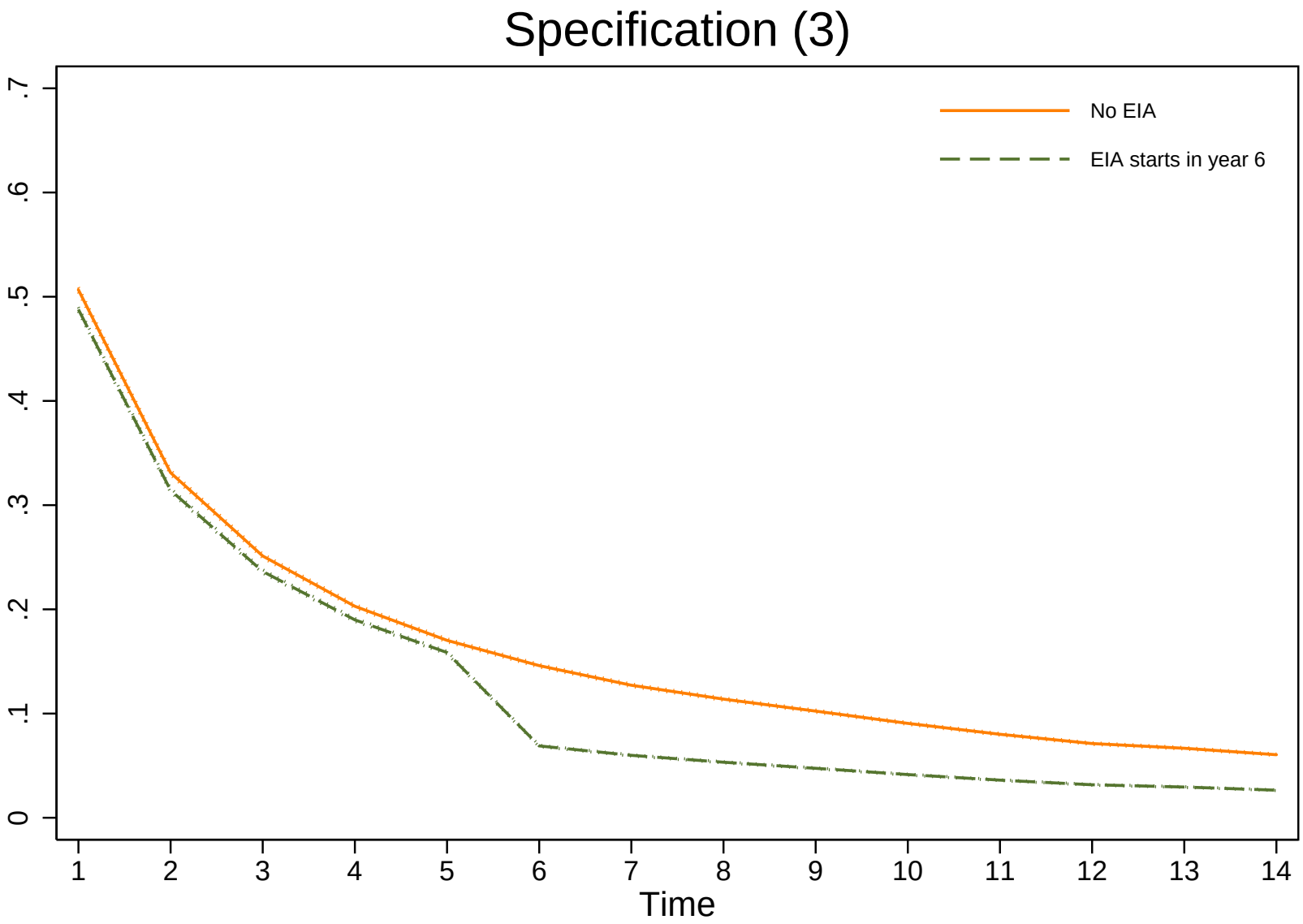
6–digit HS Results

	1962-2005 SITC data			1989-2005 HS data		
	Hazard	Growth	Initial volume	Hazard	Growth	Initial volume
Duration (ln)						
Init vol (ln)						
Imp GDP (ln)			0.170***			0.282***
Exp GDP (ln)			0.103***			0.161***
Dist (ln)			-0.176***			-0.208***
Contig			0.233***			0.239***
Com lang			0.058***			0.101***
EIA exists			0.121***			0.451***
EIA in effect			-0.168***			0.271***
Start after EIA						
Dur of EIA (ln)			-0.017***			-0.127***
Constant			7.023***			5.256***
Observations			7,174,557			17,449,377
Relationships			3,109,559			11,831,067
R^2			0.038			0.089
ρ						

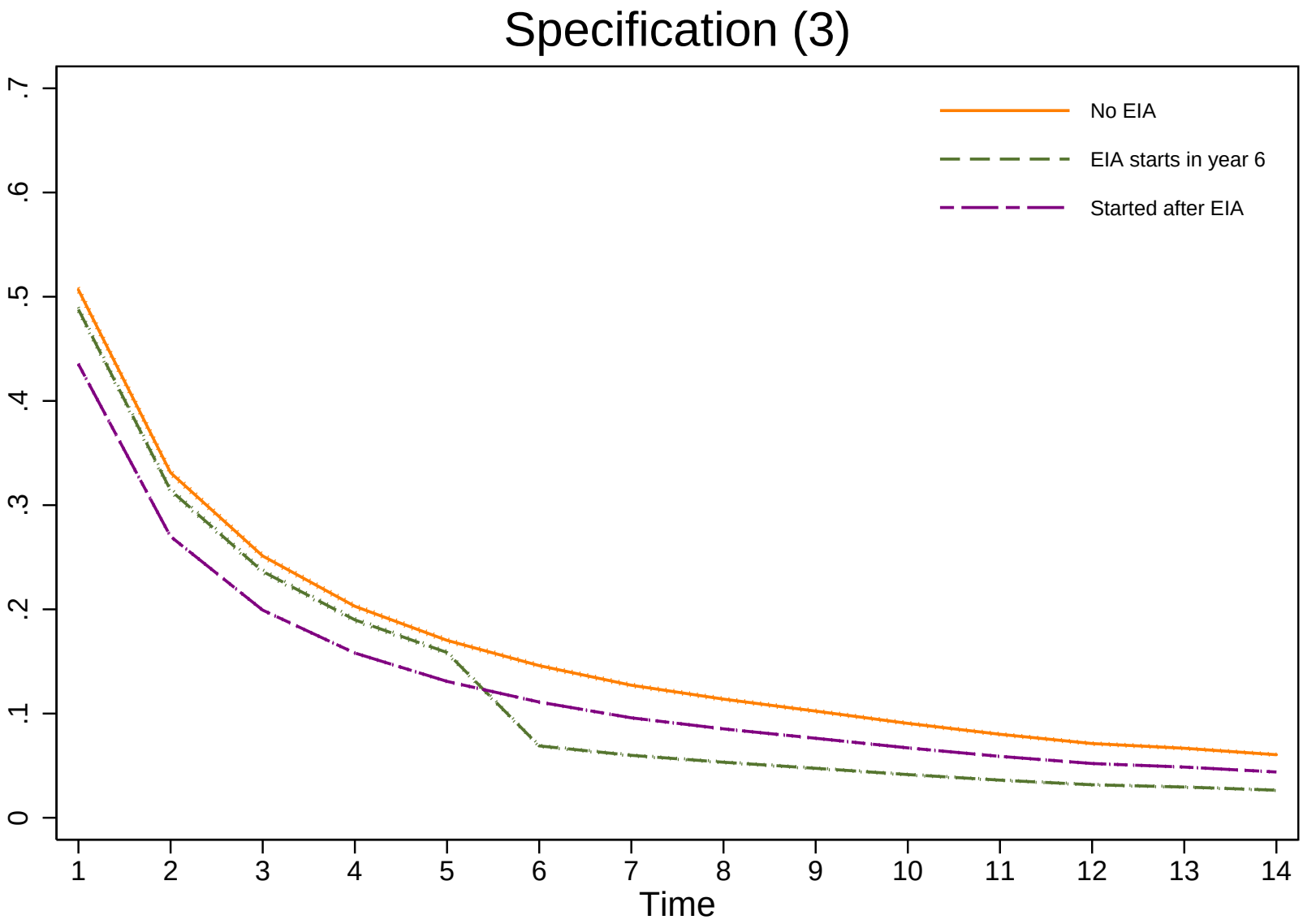
6–digit HS Results



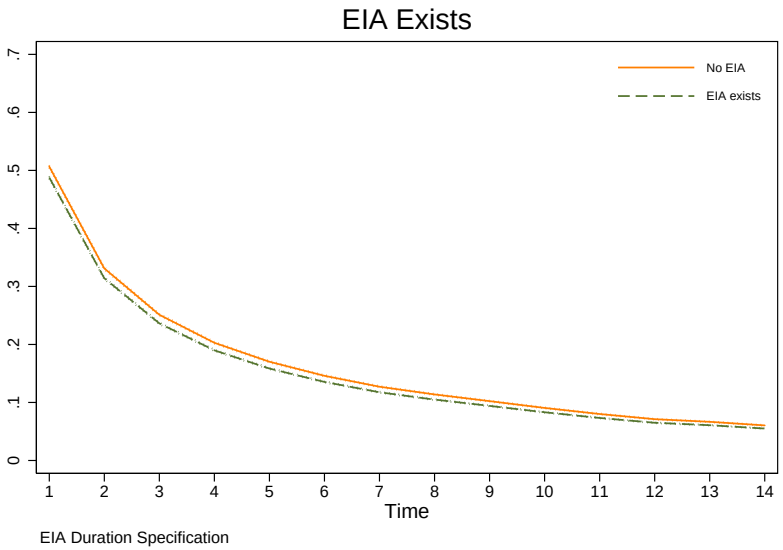
6–digit HS Results

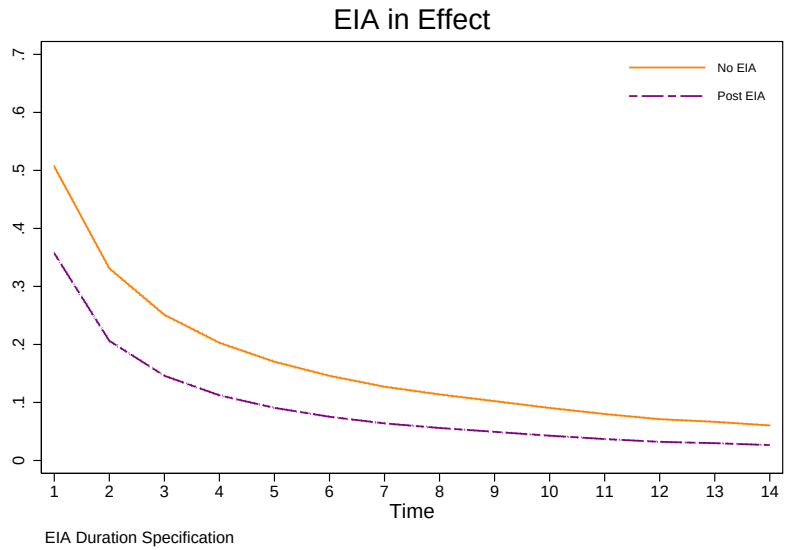


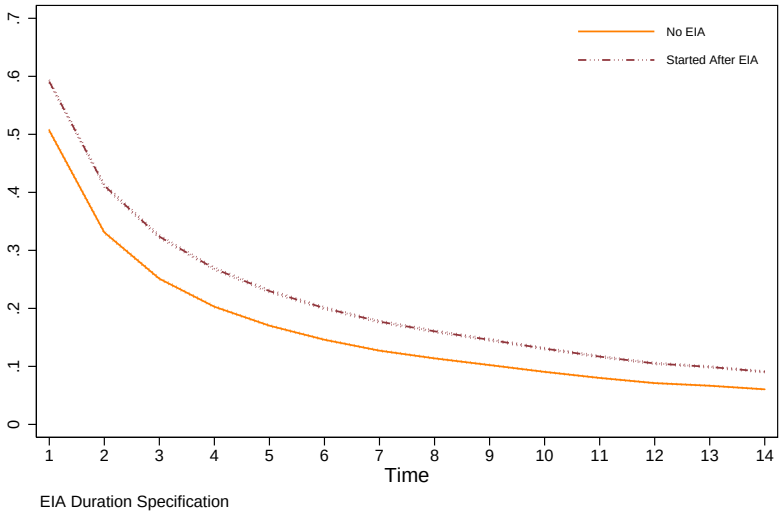
6–digit HS Results

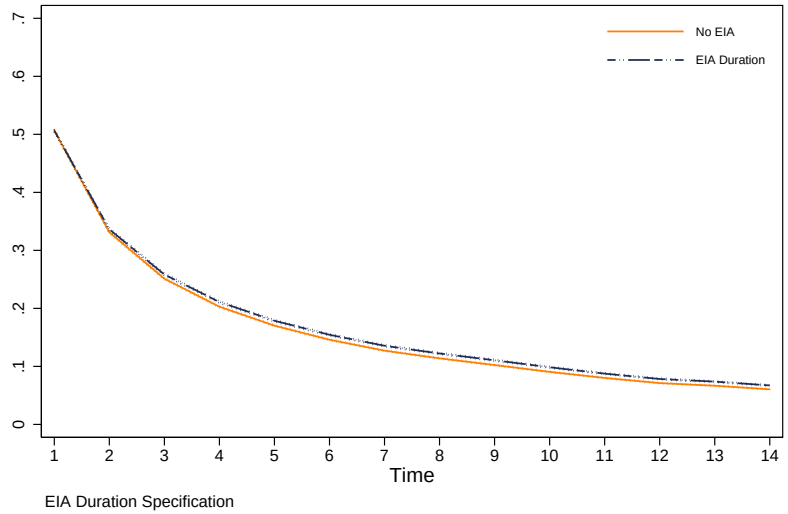


6–digit HS Results









What it all Means

- Baier and Bergstrand (2007) show EIAs have a delayed effect on trade volumes
- It takes up to 10 years for the entire effect to play out
- Baier, Bergstrand, and Feng (2013) show that with time the effect of EIAs become stronger at the extensive margin at the expense of the intensive margin
- With time, the number of relationships starts to play a larger role than their average size
- We show that EIAs have a differential effect at a disaggregated level
- Increase duration and growth of already active spells
- Reduce duration and growth of newly created spells

What it all Means

- EIAs increase duration and growth of already active spells
- Boosts the intensive margin
- Accounts for Baier, Bergstrand, and Feng's (2013) result of the larger effect of EIAs on the intensive margin in the short run
- These spells are rooted in fundamental reasons for trade
- Benefit from reduction in trade costs generated by EIAs

What it all Means

- EIAs reduce duration and growth of newly created spells
- With time, the spells which benefit from EIAs peter out
- Replaced by newly created spells which are negatively affected in terms of initial volume, duration, and growth
- All hurt the intensive margin
- The extensive margin grows in importance
- Reduced costs of trade due to EIA make it easier to start up trade relationships
  1. cheaper to start new relationships
  2. failure becomes less costly $\Rightarrow$ more entry and exit, more experimentation

Thank You!

Identifying the EIA Type Specific Effect(s)