

**KU LEUVEN**

# Secondary Cities and Agricultural Transformation: Evidence from Ethiopia

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# Urbanization

- Urbanization is quickly increasing in SSA
  - Growth and concentration in medium-sized cities
  - Economic development and poverty
- Composition of urbanization
  - Agglomeration in mega cities
  - More dispersed pattern leads to more inclusive growth
- Conference topic
  - Indirect mechanism
  - Broader impacts

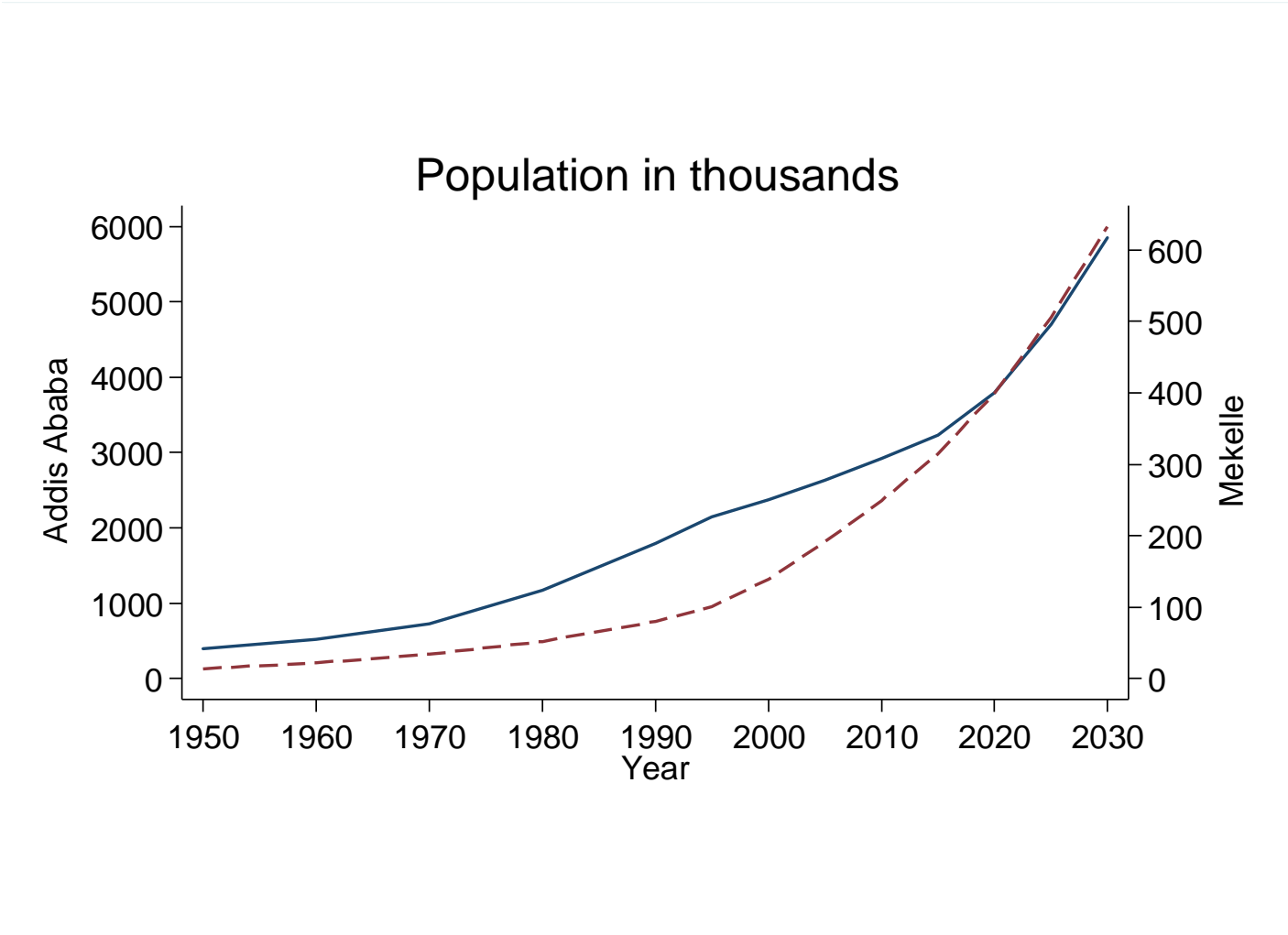
# Secondary Towns

- Migrants' outcomes
  - More accessible non-farm sector
  - Migration less costly
- Hinterland effects
  - Remittances, wage effects, etc.
  - Consumption linkage
    - Higher urban demand
    - Agricultural production in rural hinterland
- Rural development
  - Small scale and rural farming

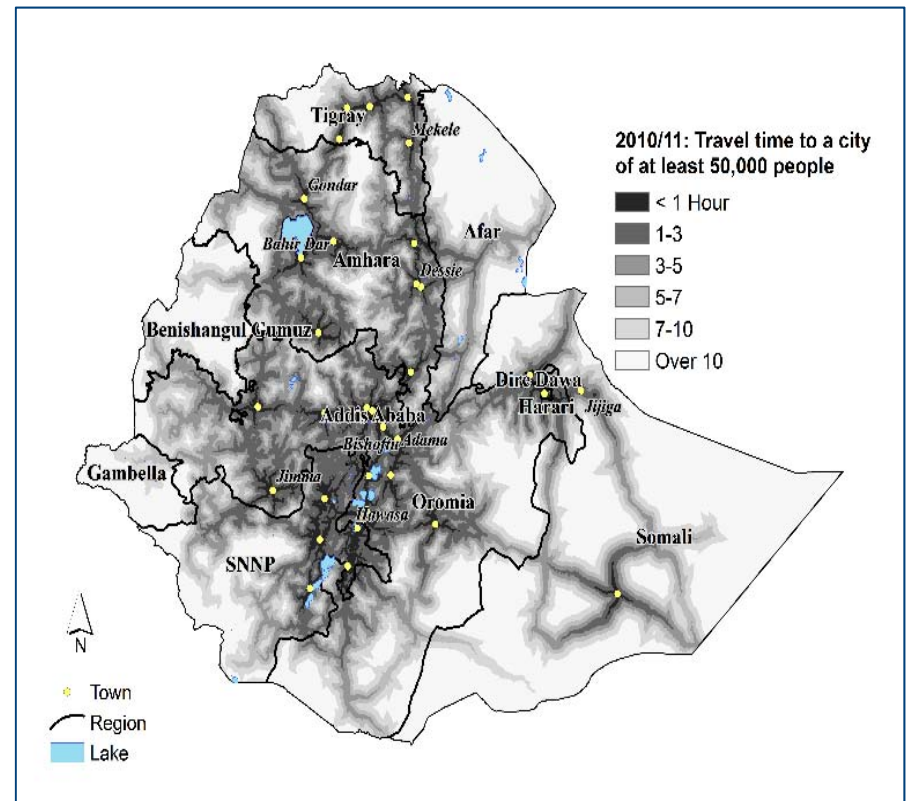
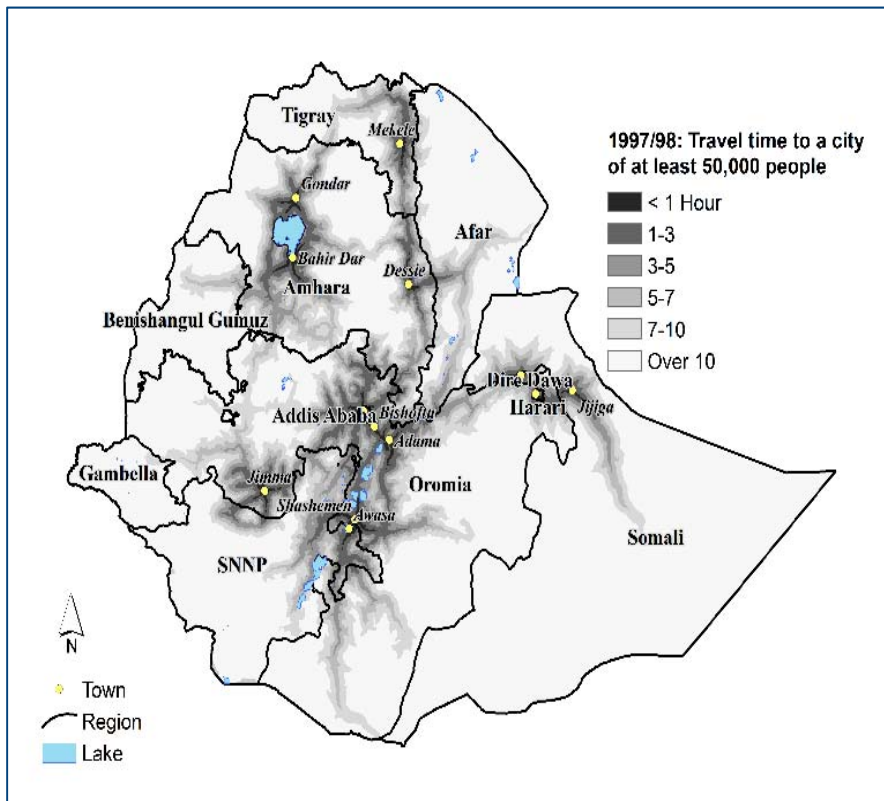
# Cities & Agriculture in Ethiopia

- Ethiopia is urbanizing fast
  - Urban share will triple in next decade
  - People are concentrating in cities
    - Addis Ababa
    - Secondary towns
- Teff is major staple crop
  - Produced by 6 million farmers
  - Consumed daily by 2/3 Ethiopians
  - Economically superior good

# Cities are growing fast in Ethiopia

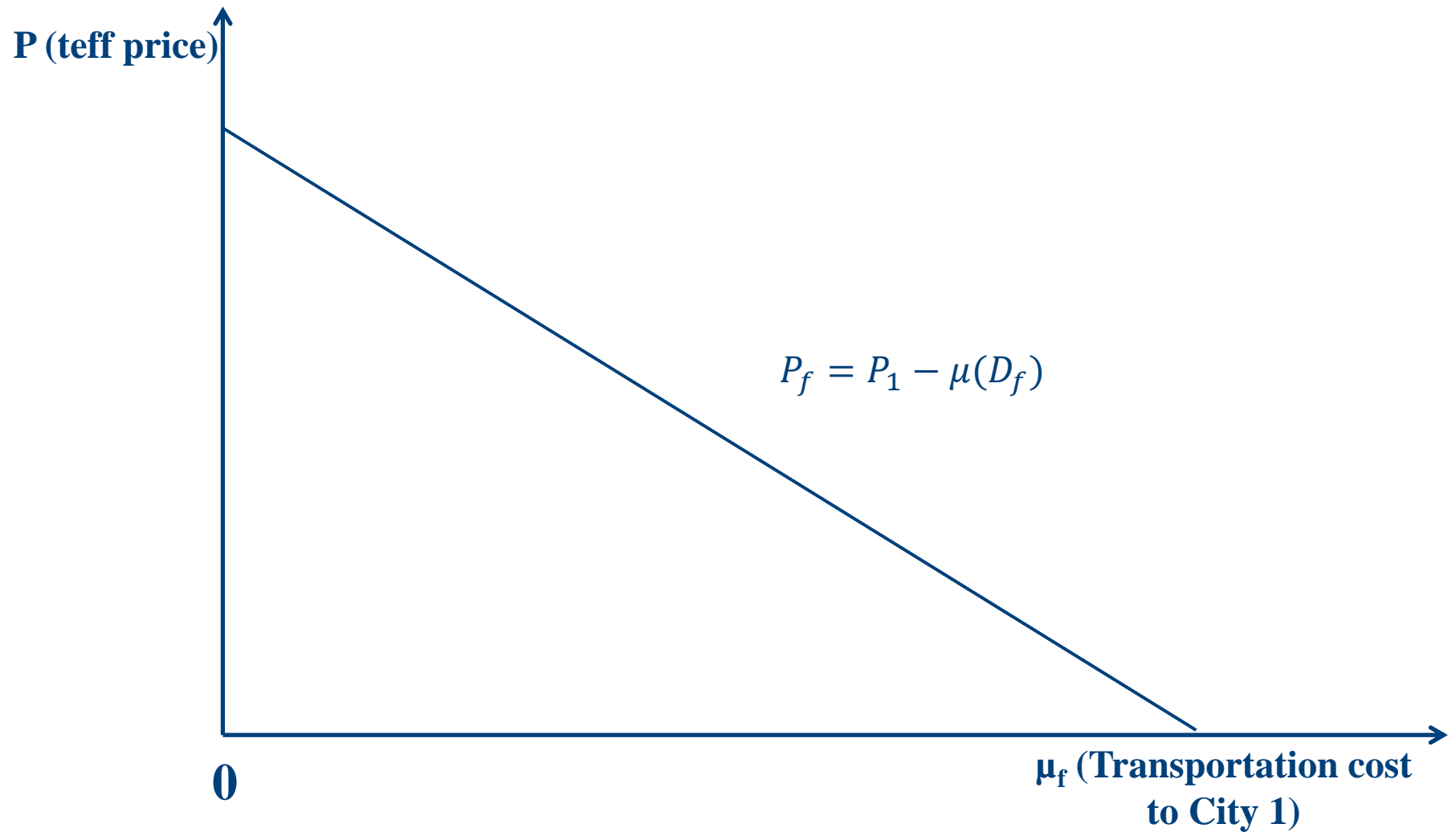


# Market Access has improved



# Conceptual framework

# Agriculture and 1 City

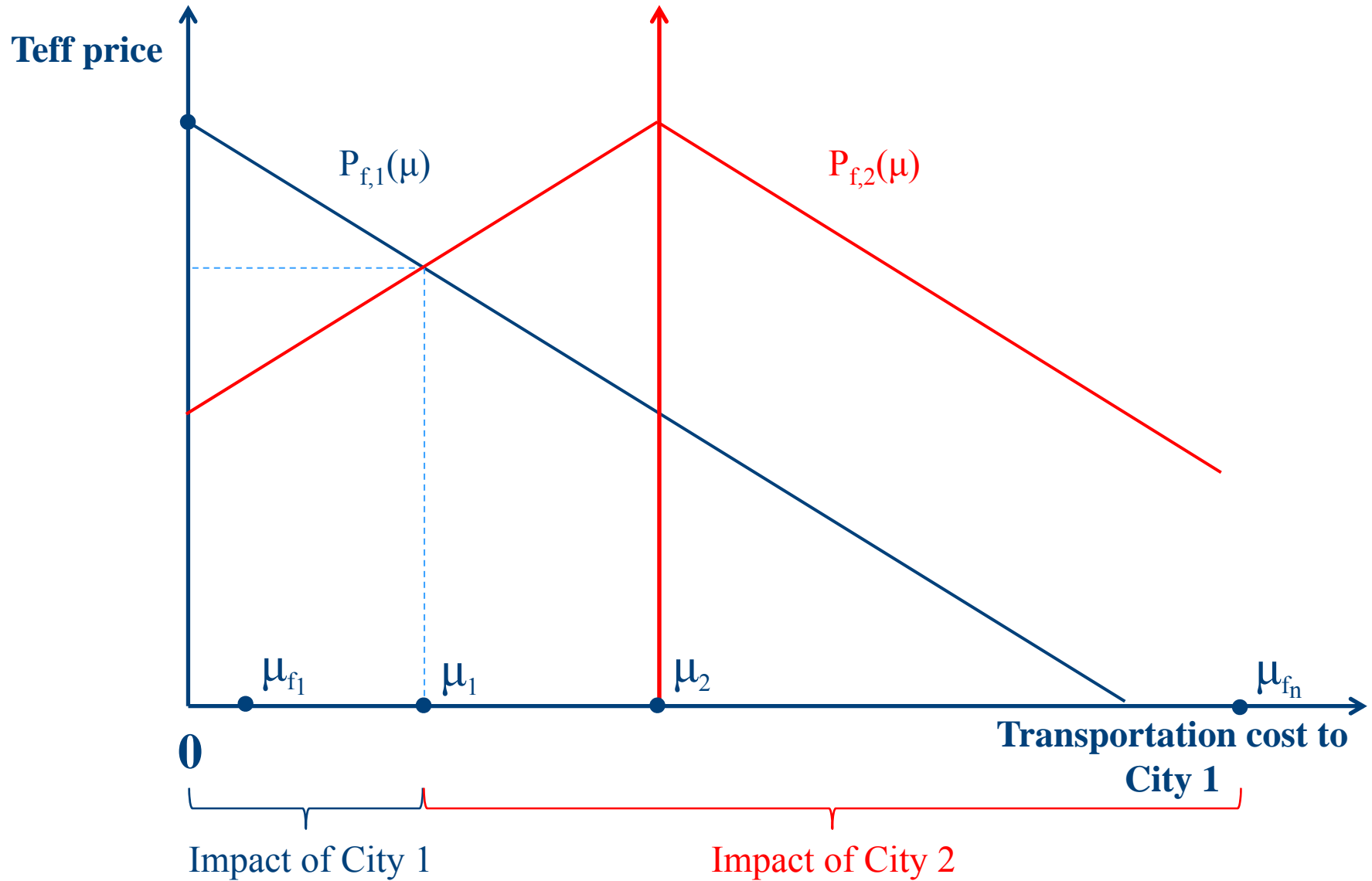




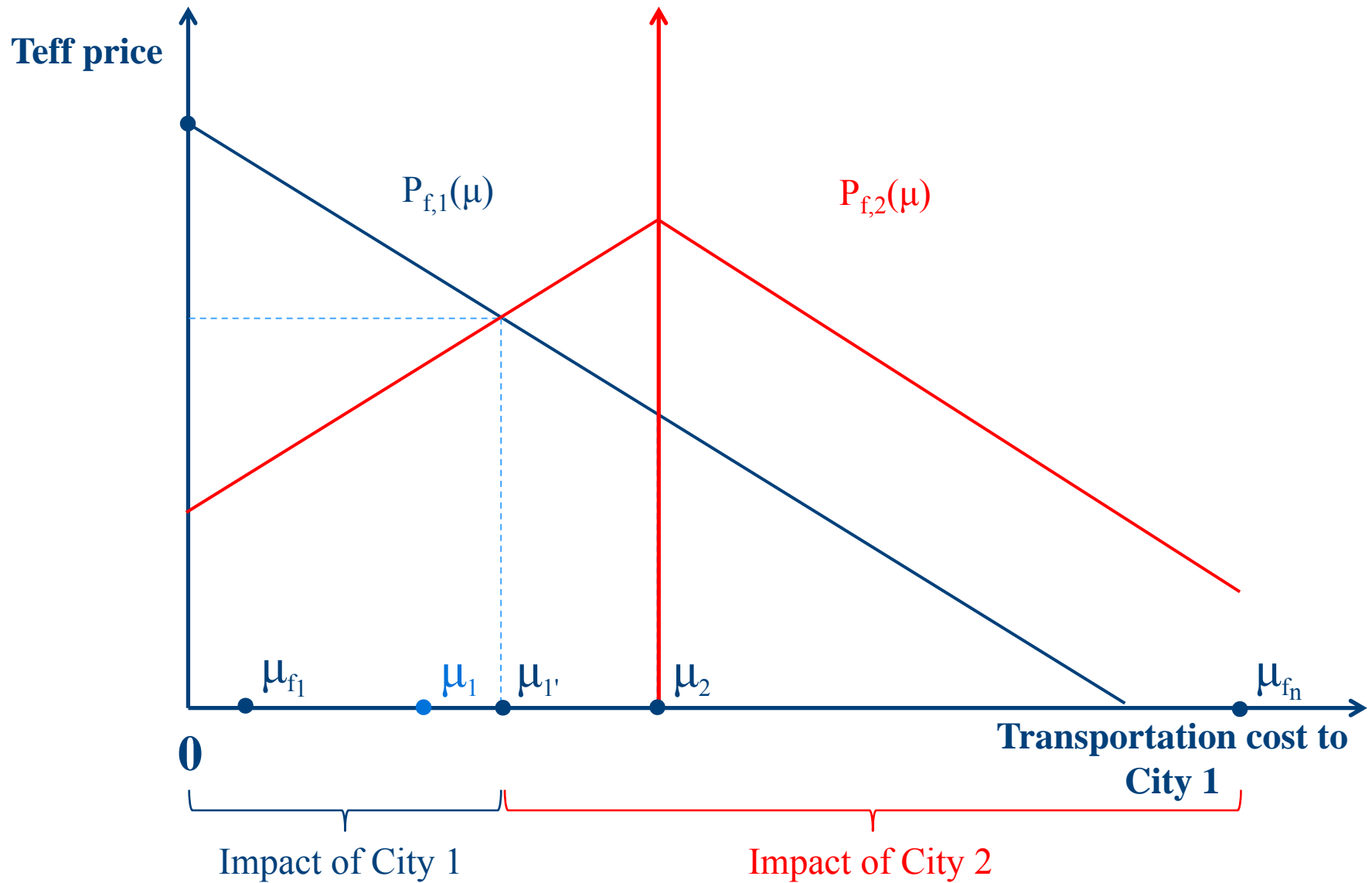
# Agriculture and 2 Cities

- Now: Urban proximity to 2 cities
  - Presence of city 2 (Secondary Town) at  $\mu_2$
  - Same price  $P_2$  and per unit transport cost
  - $P_{f,1} = P_1 - \mu$  and  $P_{f,2} = P_2 - |\mu_2 - \mu|$ .

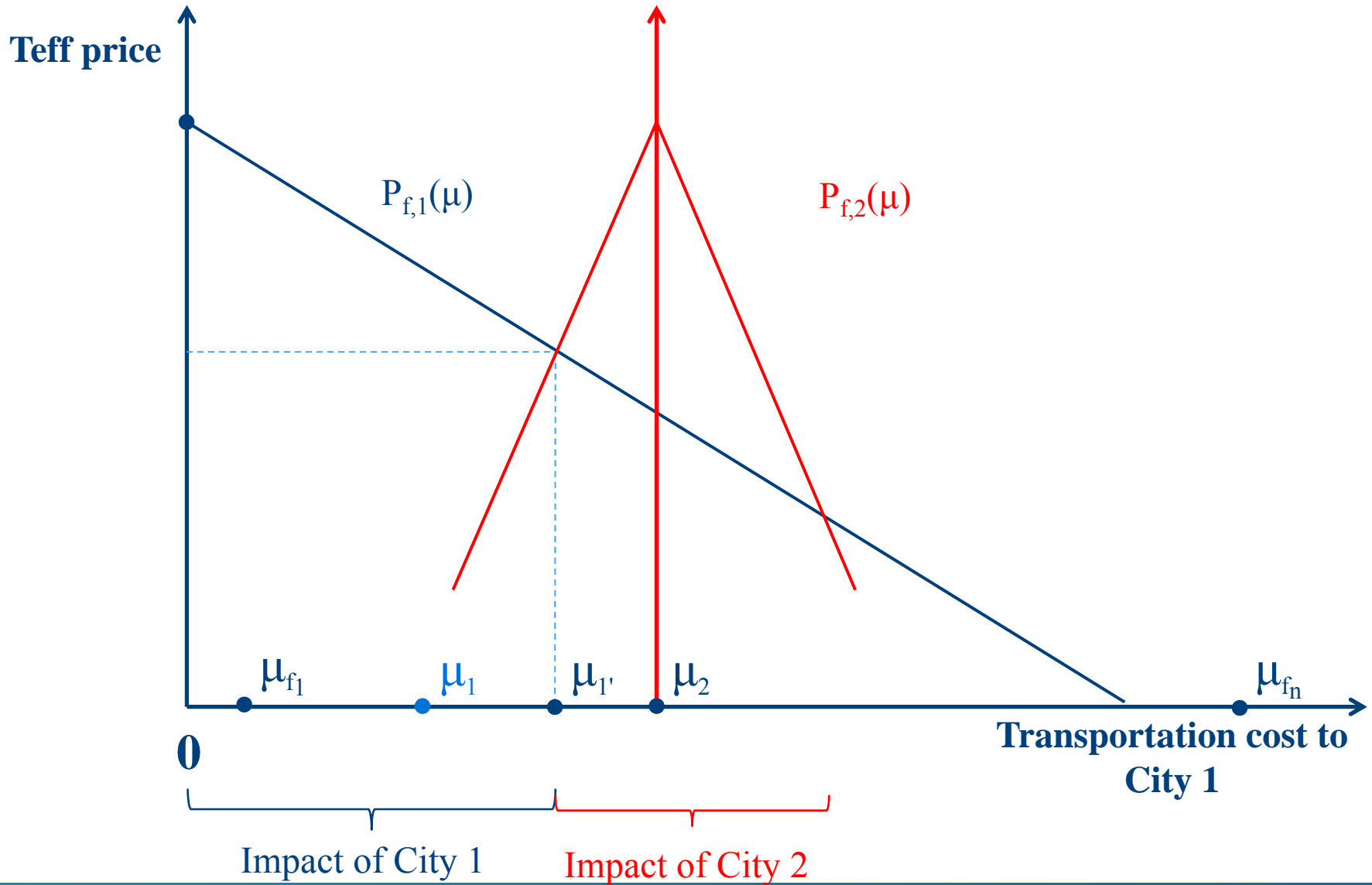
# Prices and 2 cities



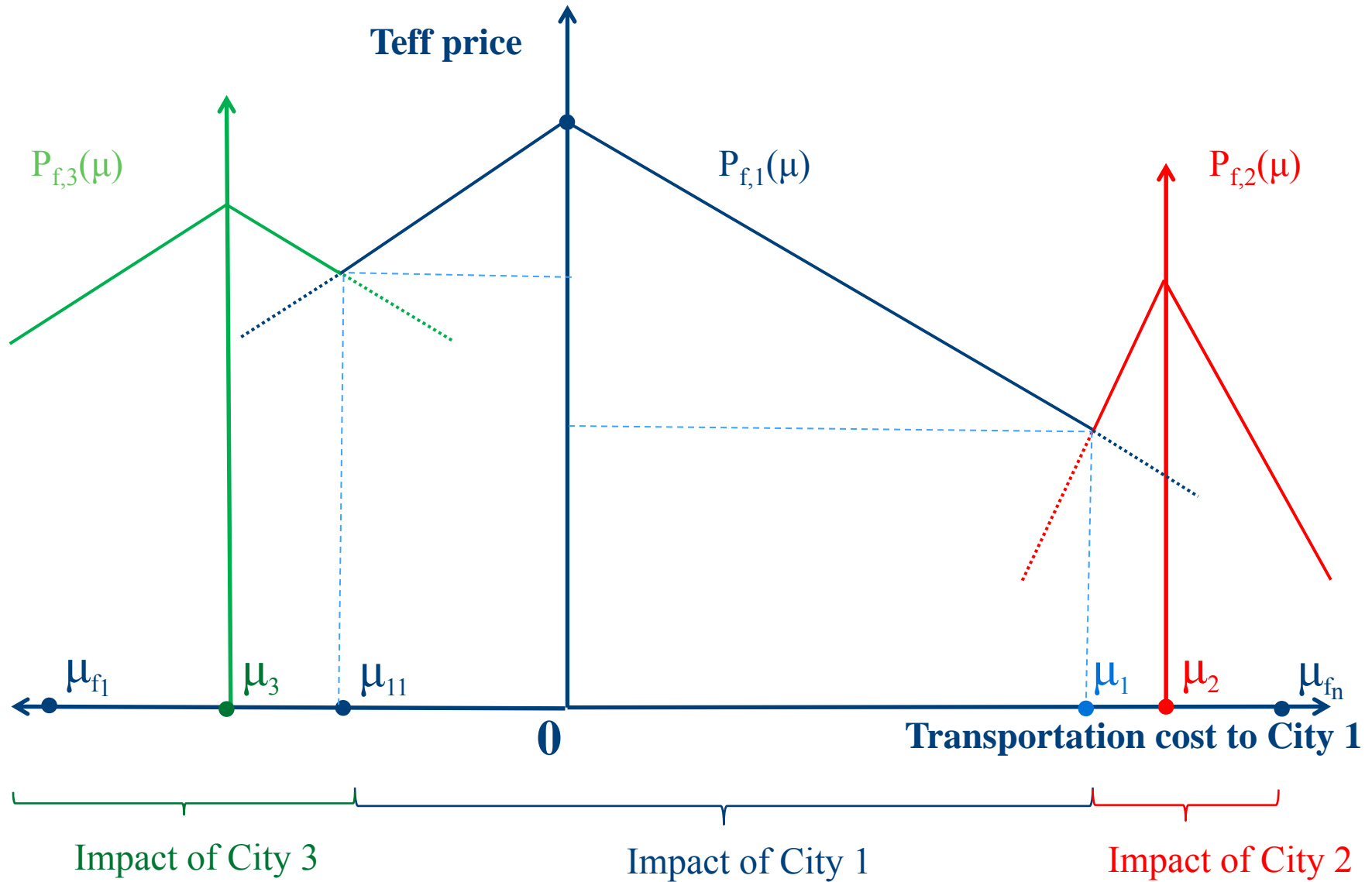
# Prices and 2 cities



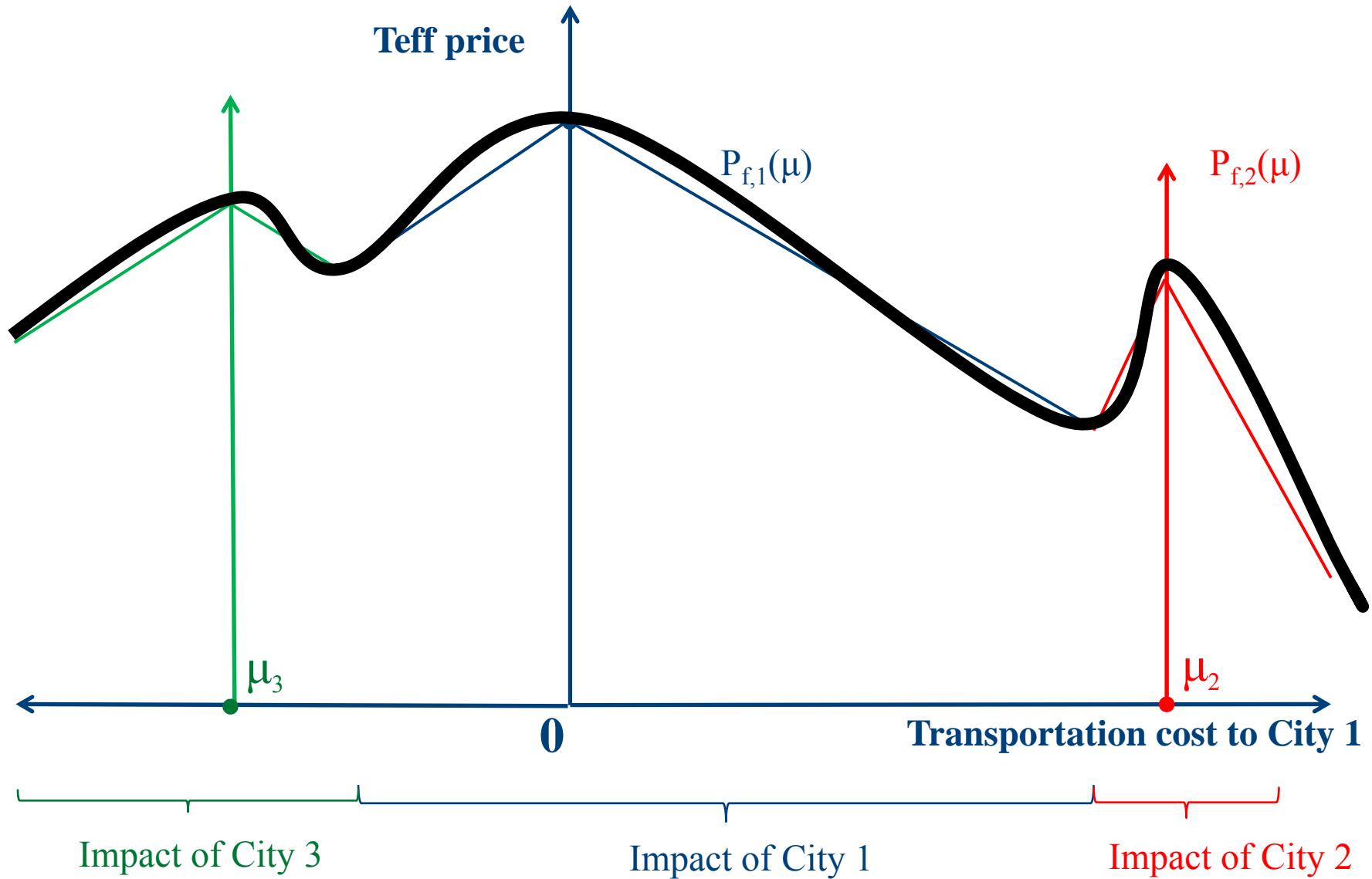
# Prices and 2 cities



# Prices and many cities



# Prices and many cities



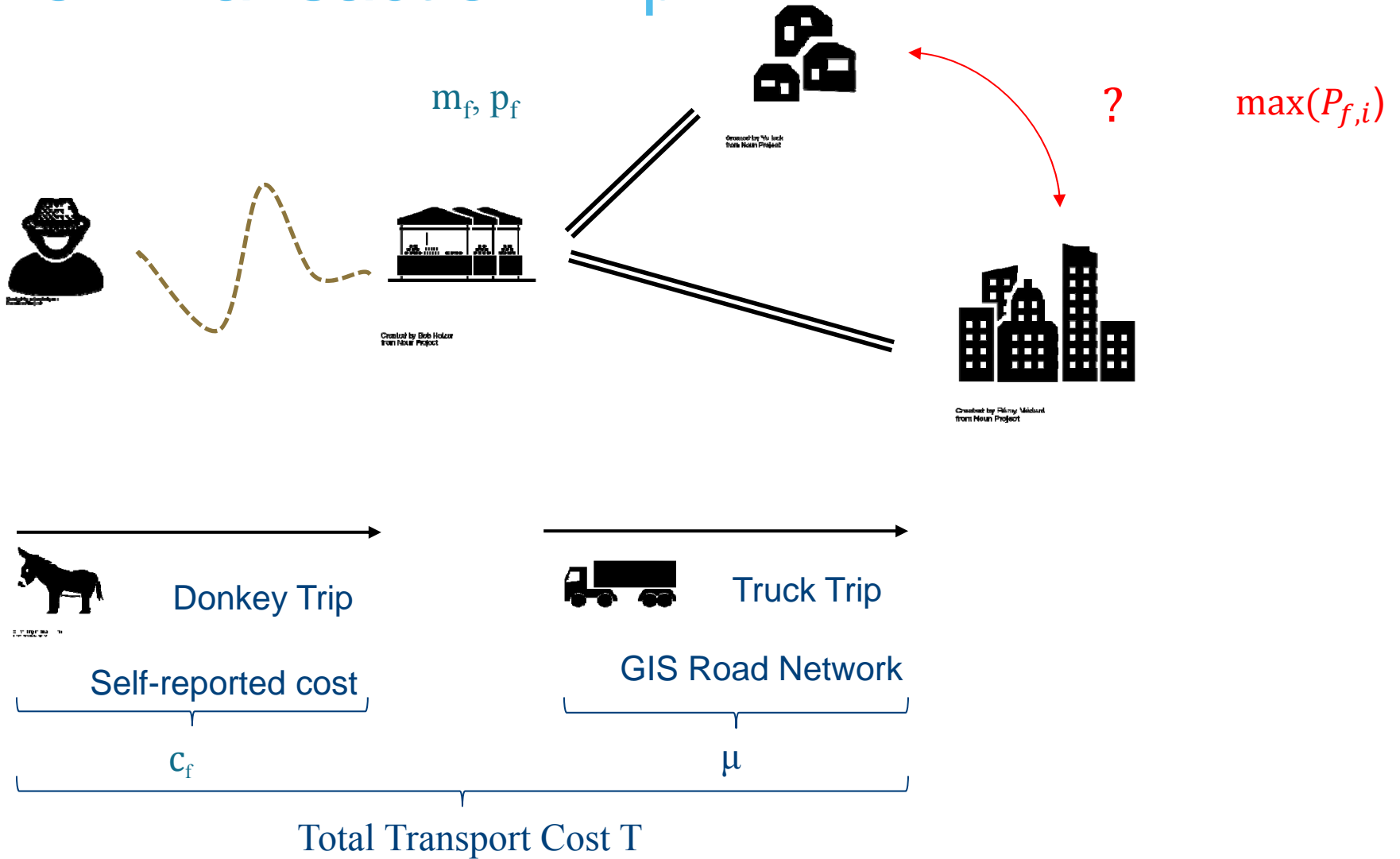
Data

# Survey Data

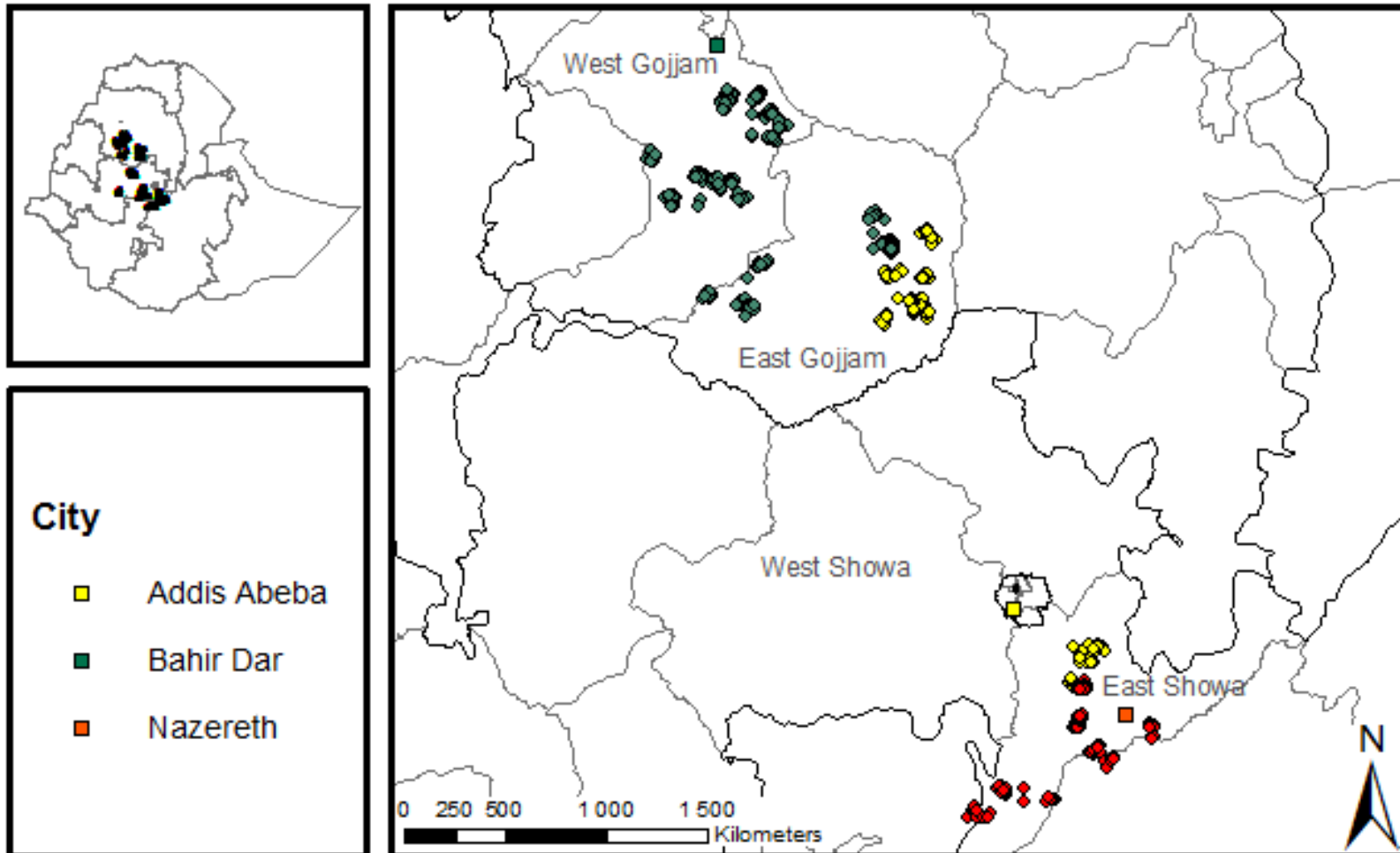
- Teff value chain survey in 2012 (cross sectional)
  - 36 randomly selected villages in major teff producing areas
  - 720 randomly selected farmers
- Urban proximity
  - Transport cost
  - Cost of transporting 1 quintal of teff (ETB/quintal)
- Cities in survey area
  - Capital: Addis Ababa
  - Secondary towns: Nazareth and Bahir Dar
  - Select city that maximizes net prices :  $P_{f,i} = P_i - \mu$



# Teff Transaction Trip



# Farmers and cities



# Results

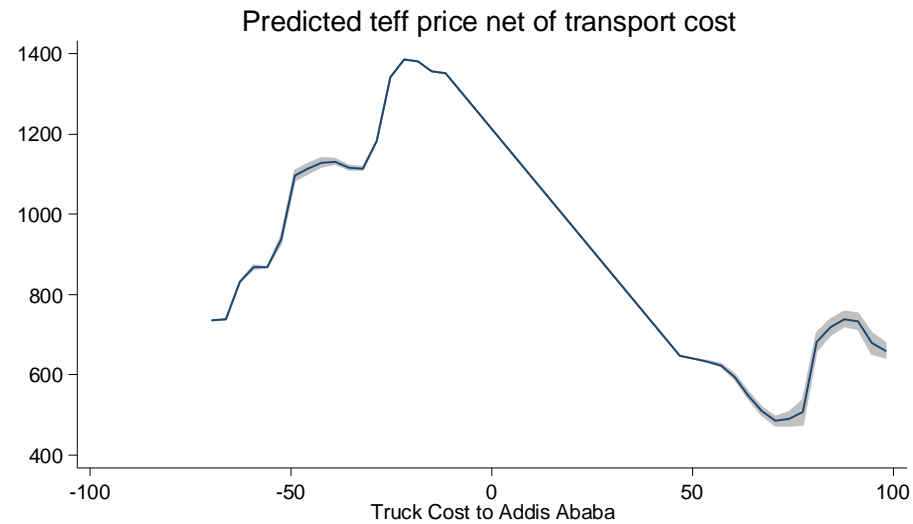
Is there an effect of Secondary  
Towns?

# Simulation of model

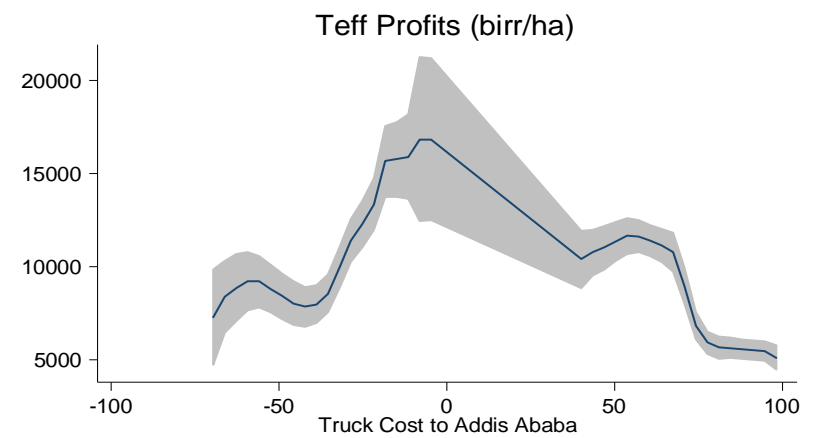
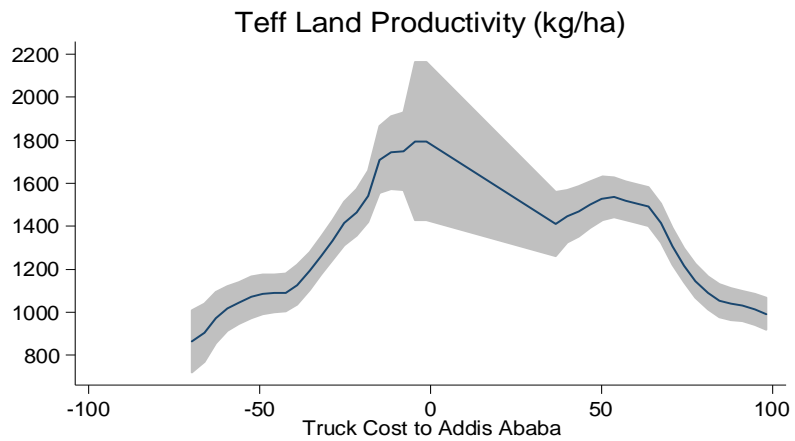
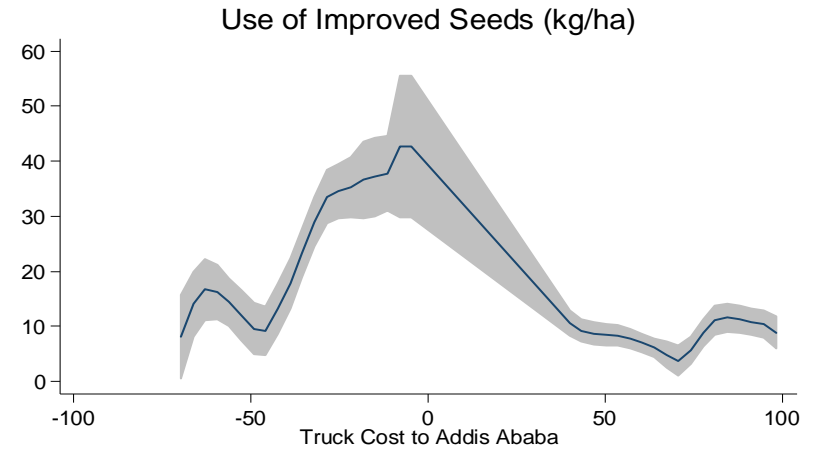
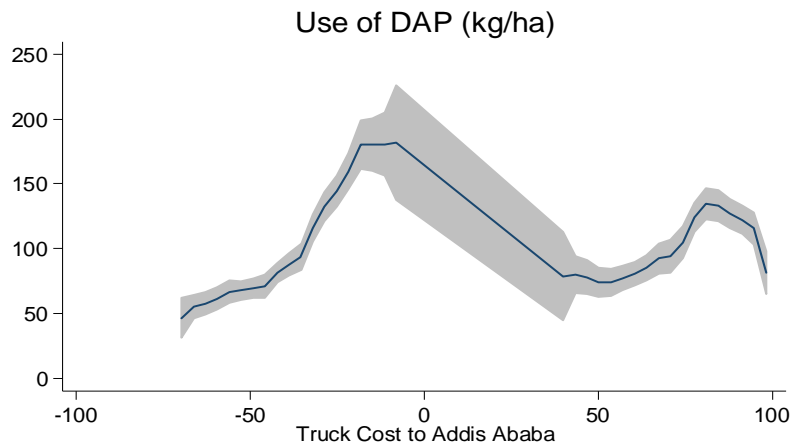
- Compare model simulation with empirical observation
- Teff price farmers receive in trader markets
  - Predicted:  $\widehat{P}_{f,i} = P_i - \mu$
  - Observed:  $P_{f,i}$
- Truck cost  $\mu$  from trader town to Addis Ababa



# Predicted vs. Observed teff prices



# Other outcomes



# Results

Size of effect

# Urban proximity & Agricultural Outcomes

- Effect of (total) transport cost  $T_i$ 
  - $Y_i = \alpha_y + \beta_y * T_i + X_i + P_i + Z_i + \varepsilon_{i,y}$
  - $Y_i$  : improved seed usage, productivity and profits
  - $X_i$  : controls
  - $P_i$  : output and input prices
  - $Z_i$  : zone fixed effects
- Effect  $\beta_y$  dependent on type of city?
  - $Y_i = \alpha_y + \beta_y * T_i + \gamma_y * S_i + \pi_y * (S_i * T_i) + X_i + P_i + Z_i + \varepsilon_{i,y}$
  - $S_i$  dummy for Secondary Towns
  - $\beta_y$  is effect for farmers shipping to Addis Ababa
  - $\beta_y + \pi_y$  is effect for farmers shipping to Secondary Town



# Endogeneity issues

- Heterogeneity between farmers in  $S_i$ 
  - Household and teff production
  - Double Robust method
    - Estimation of Propensity Score
    - Weighted regression
- Endogenous location of road network
  - Better infrastructure in areas with higher economic potential
  - Instrumental Variable (IV) Approach
    - 'Natural path' walking distance

# Preliminary results

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## Secondary Town

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Teff price (ETB)	—***
Wages (ETB)	0
Fertilizer (kg/ha)	0
Improved Seed (kg/ha)	0
Labor (days/ha)	0
Yield (kg/ha)	—***
Labor Productivity (kg/day)	—**
Teff Profits (ETB/ha)	—***

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# Conclusions

# Cities & Agricultural transformation in Ethiopia

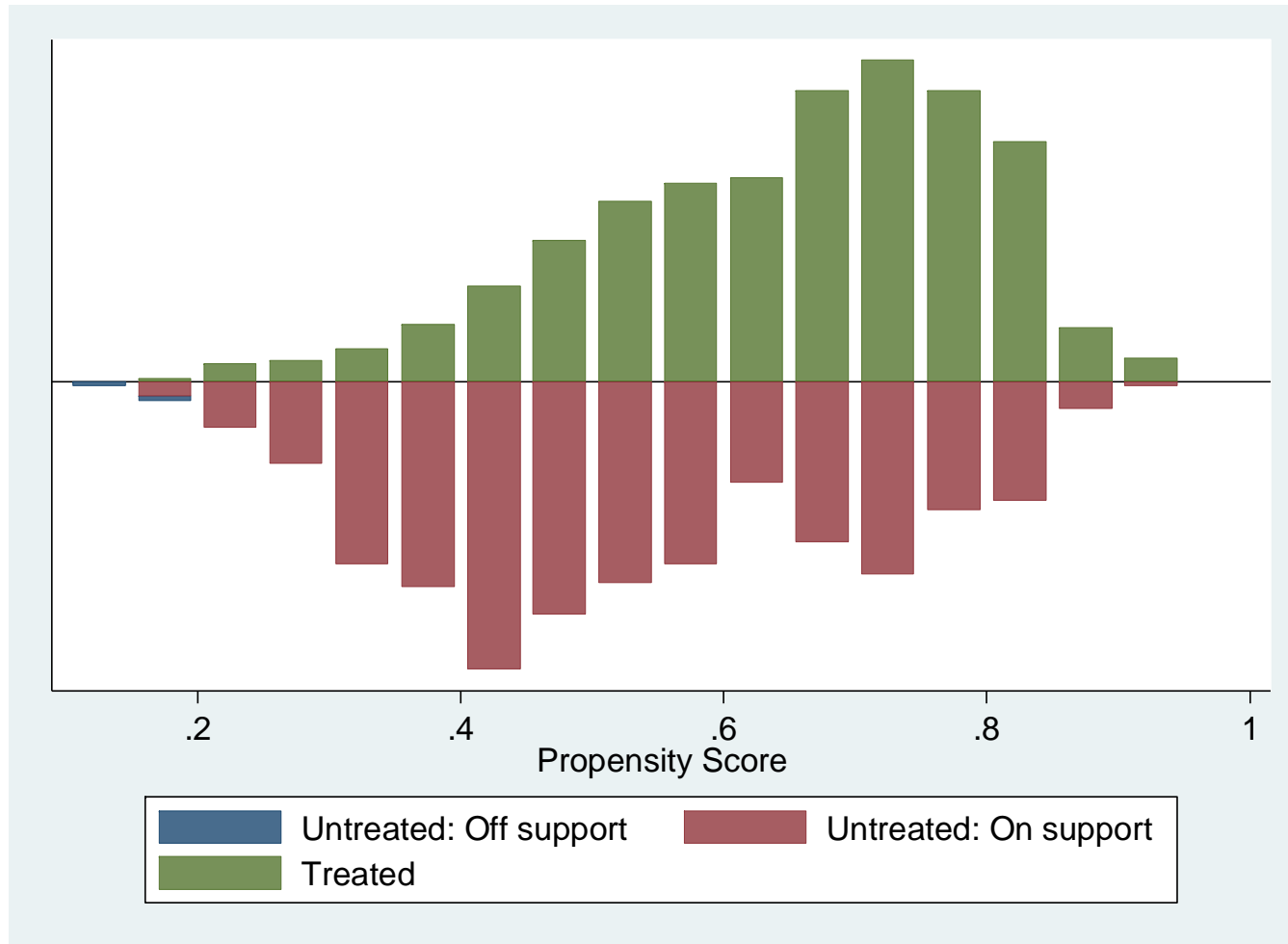
- Impact of urban proximity on teff production decisions
- Difference between type of cities
  - Effect on prices is similar
  - Strong effect on input use in Secondary Towns
  - Strong effect on labor productivity in Capital
- Way forward
  - Improve empirical results
  - Welfare implications
  - Other mechanisms

Thank you!

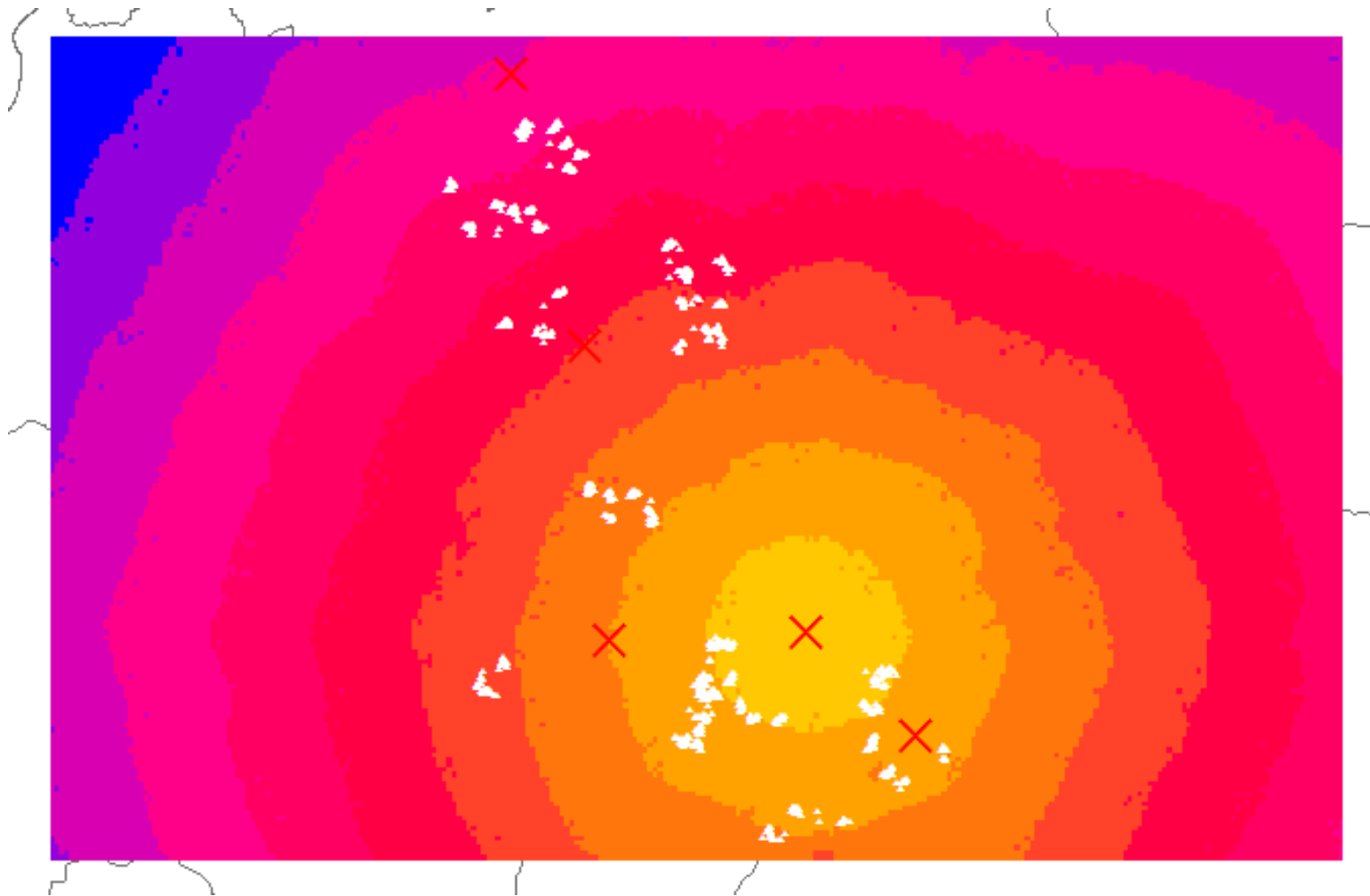
# Propensity Score

	Secondary town (Yes=1)
Age of head (years)	0.00 (0.00)
Gender of head (male=1)	0.03 (0.16)
Educated head (years=1)	0.14 (0.08)
Head is from Oromia (yes=1)	-0.67*** (0.09)
Size of the household (number)	0.02 (0.04)
Children in the household (number)	0.05 (0.04)
Household owns radio (yes=1)	-0.10 (0.11)
Household owns tv (yes=1)	-0.55** (0.24)
Household owns mobile phone (yes=1)	-0.53*** (0.11)
Farm assets (ln of ETB)	0.16*** (0.05)
Wealth index (PCA of household assets)	-0.29*** (0.10)
Farming Ability (.)	0.06 (0.07)
Land owned (ha)	-0.09*** (0.03)
Constant	0.82 (0.70)

# Balancedness of matching



# Natural Path





# First Stage result

First stage	Transportation Cost (ETB/quintal)		Transportation Cost * Secondary Town
Natural Path (hours)	1.38*** (0.26)		0.81*** (0.15)
Natural Path * Secondary Town	0.36 (0.26)		1.27*** (0.24)
Secondary Town	-2.15 (5.79)		25.12*** (5.36)
Controls		yes	
Prices		yes	
R <sup>2</sup>	0.590		0.890
Shea's Adjusted Partial R <sup>2</sup>	0.244		0.330

# Preliminary results

- Teff outcomes are lower in Secondary Towns
- Effect of distance
  - Teff price and fertilizer use: similar
  - Fertilizer and labor use: larger for farmers shipping to a Secondary Town
  - Improved seed use, teff yield, labor productivity and profits: larger for farmers shipping to Addis

# Urban proximity and prices

Prices	log of teff prices (ETB/quintal)		log of wage (ETB/day)	
	OLS	IV	OLS	IV
	<b>Urban proximity</b>			
Truck Cost (ETB/quintal)	-4.52*** (0.92)	-3.35** (1.33)	-3.77 (4.76)	-5.85 (5.68)
Wu-Hausman F(3,715)		10.49***		11.75***

# Urban proximity and inputs

Inputs	DAP (kg/ha)		Improved Seed (kg/ha)		Labor (days/ha)	
	OLS	IV	OLS	IV	OLS	IV
	<b>Urban proximity</b>					
Transportation Cost (ETB/quintal)	-1.80*** (0.35)	-2.30*** (0.64)	-0.36** (0.13)	-0.32* (0.18)	-1.07*** (0.28)	-0.64 (0.50)
Wu-Hausman F(3,715)		4.30**		2.84**		3.55**

# Urban proximity and productivity

Outcomes	Yield (kg/ha)		Labor Productivity (kg/day)		Teff Profits (ETB/ha)	
	OLS	IV	OLS	IV	OLS	IV
	<b>Urban proximity</b>					
Transportation Cost (ETB/quintal)	-14.63*** (1.89)	-10.62** (4.73)	-0.06*** (0.01)	-0.05 (0.04)	-89.28*** (21.46)	-22.24 (51.35)
Wu-Hausman F(3,715)		3.80*		0.39		10.80***

# Urban proximity and welfare

Welfare	log of Wage income (ETB)		log of Commerce income (ETB)	
	OLS	IV	OLS	IV
	<b>Urban proximity</b>			
Transportation Cost (ETB/quintal)	-0.00 (0.00)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Wu-Hausman F(3,1177)		0.10		0.41