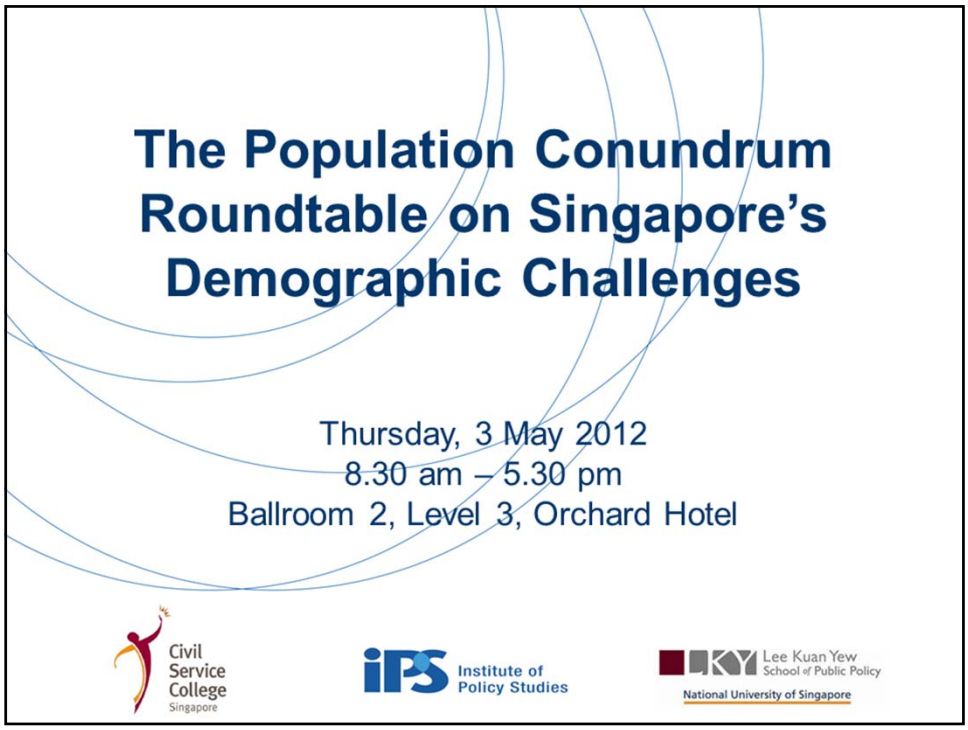
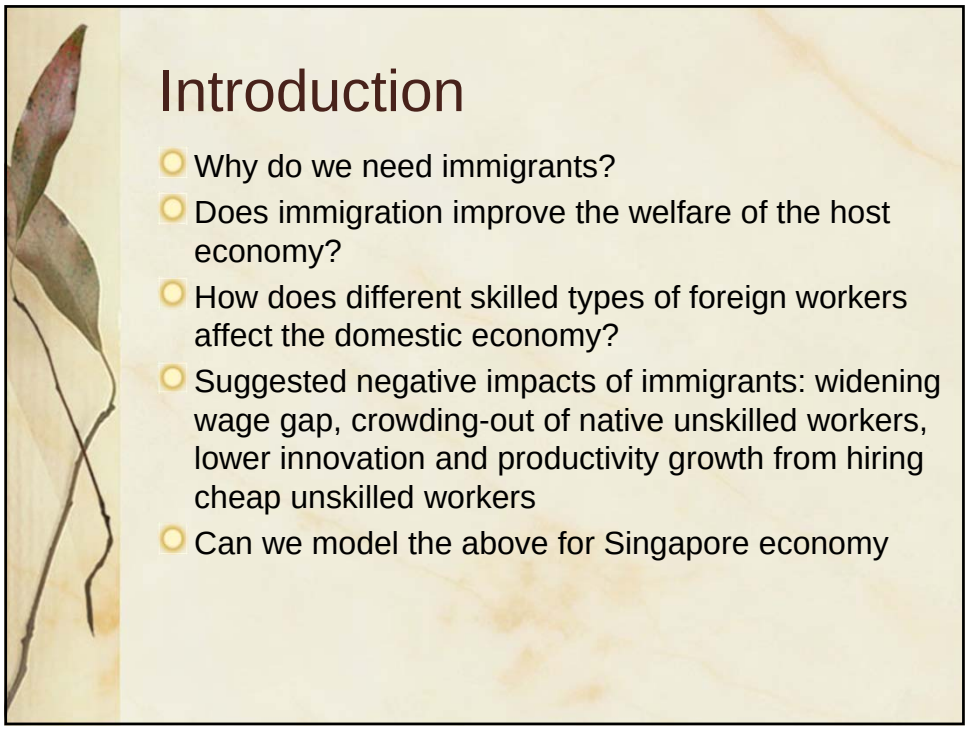




Models of Immigrants

- Rural-Urban migration models – wage equalization
- Agricultural sector productivity and development is important (non-tradable sector?)
- Trade and Factor Mobility – Wage Equalization, Improve welfare due to increase trade
- Recent models: Immigrants increase Innovation and Growth – market driven wage-gap intensifies

Objectives

- Impact of immigrants depends on the domestic capacity: human capital, technology and infrastructure – Borjas and Hanson (2008), Ottaviano and Peri (2008), and Peri and Sparber (2009)
- Examine the impact of immigration on Singapore economy using a three-sector general equilibrium model with endogenous growth
- Immigration Surplus (Borjas(1995); Drinkwater, Levine, Lotti and Pearlman (2007))
- Impact on wage gap
- Innovation capabilities of the economy: Important for ASEAN
- Long-term growth rate of Singapore economy: Economic Strategic Committee (2010)

Literature Review:
Immigration Surplus

- Borjas (1995), the immigration surplus is defined as the increase in income of the native population in the host country as a result of immigration
- Drinkwater, Levine, Lotti and Pearlman (2007) revisited Borjas' work by calibrating a three-sector general equilibrium model to the European Union economies

Implications

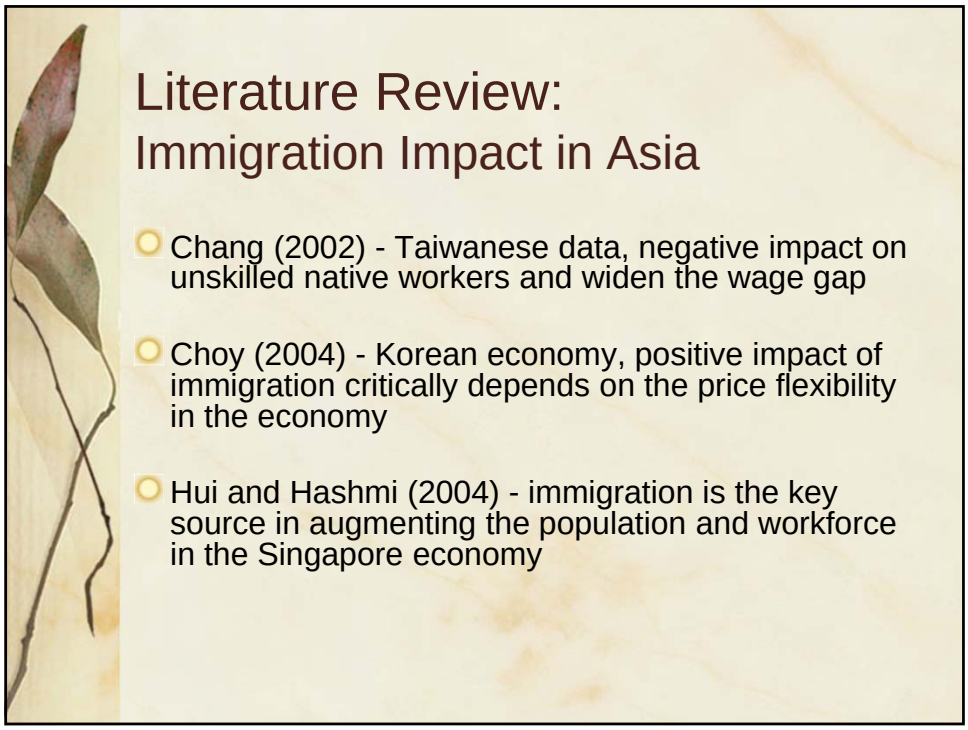
- Wages only depend on relative supplies
- Implies immigration only affects natives if alters skill mix
- Will always be gains to natives if immigration affects skill mix
- Largest if immigrants very different

Literature Review:
Wage Effects

- Borjas (2003) - downward pressure on the native wages, particularly for unskilled workers
- Card (2004) - no significant change in wage rates
- Borjas (2009) - short-run wage effect negative and long-run effect may be negative
- Peri (2009) - 0.5% increase in income per worker as a result of 1% increase in employment due to immigration inflow in U.S.

Literature Review:
Immigrants on Innovation

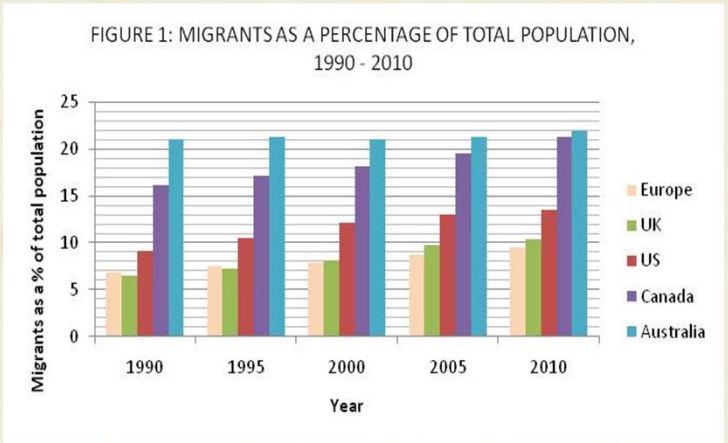
- Hunt and Gauthier-Loiselle (2008), conclude that skilled immigrants exert positive effect on innovation during the 1950-2000 period in the United States.
- Augment domestic human capital with least cost
- Does low-cost foreign labour reduce the incentive to innovate in the Singapore economy?



Literature Review:

Composition Amenities (Immigration, Wages, and Compositional Amenities ,Card, Dustmann and Preston; 2009)

- 'Compositional amenities' as the degree of social homogeneity or more generally, social cohesion
- Card at. el. found that compositional concerns are significantly more important in understanding the variation in attitudes toward immigration policy.
- The externalities from concerns about compositional amenities may offset the economic benefits associated with immigration, and in turn negatively affect overall views about immigration policy.



Fraction Foreign-Born

Country	All	Low Education	Medium Education	High Education
Australia	27.4%	23.4%	30.5%	28.9%
Austria	13.8%	19.2%	10.2%	14.3%
Belgium	12.0%	12.1%	8.7%	10.1%
Canada	22.4%	21.6%	20.0%	25.8%
Czech Republic	5.2%	8.4%	3.8%	6.4%
Denmark	7.4%	8.6%	5.9%	7.6%
Finland	2.7%	3.4%	2.1%	2.2%
France	11.7%	13.6%	8.7%	12.4%
Germany	13.4%	22.0%	9.9%	11.0%
Greece	10.8%	9.1%	13.1%	12.1%
Hungary	3.2%	3.0%	2.9%	5.8%
Ireland	11.0%	7.0%	10.8%	18.1%
Italy	4.1%	3.5%	4.9%	6.1%

Fraction Foreign-Born continued

Japan	1.1%	1.0%	0.9%	1.1%
Luxembourg	36.6%	42.0%	28.6%	49.0%
Netherlands	9.6%	12.2%	7.3%	8.8%
New Zealand	22.5%	15.1%	25.2%	24.6%
Norway	8.1%	5.4%	5.6%	8.2%
Poland	2.4%	3.6%	1.7%	2.7%
Portugal	6.7%	4.7%	13.3%	15.3%
Slovakia	2.9%	3.0%	2.6%	4.2%
Spain	5.8%	5.1%	7.8%	6.5%
Sweden	14.4%	15.5%	12.1%	14.2%
Switzerland	25.1%	32.1%	15.2%	27.7%
Turkey	2.4%	1.7%	4.1%	5.1%
United Kingdom	9.4%	8.0%	8.6%	16.0%
United States	14.3%	23.4%	10.1%	13.9%

Table 1: Inflow and Outflow of Migrant Stock in Asia at 2010

Destination Country	Outflow	Inflow
Brunei	24,343	148,123
Cambodia	350,485	335,829
China	8,344,726	685,775
Hong Kong	718,990	2,741,800
India	11,360,823	5,436,012
Indonesia	2,504,297	122,908
Japan	771,246	2,176,219
Korea	2,077,730	534,817
Malaysia	1,481,202	2,357,602
The Philippines	4,275,612	435,423
Singapore	297,234	1,966,865
Thailand	811,123	1,157,263
Vietnam	2,226,401	69,307

Source: World Bank

Table 2: Sources of Migrant Inflow by Region to Selected Asian Countries as of 2010(%)

	Source by Region						
	East Asia	South East Asia	South Asia	Europe	Australia& New Zealand	North America	Others
Brunei	2.9	81.4	10.0	3.2	0.5	0.2	1.8
Cambodia	2.6	95.5	0.3	0.6	0.2	0.3	0.6
Hong Kong	83.7	0.0	0.0	0.0	0.0	0.0	16.3
India	0.5	1.3	92.4	0.2	0.0	0.1	5.6
Japan	55.8	15.3	2.4	2.4	0.7	2.9	20.6
Korea	55.0	21.9	3.1	1.1	0.7	8.0	10.2
Malaysia	6.2	79.9	10.4	0.7	0.4	0.0	2.5
Philippines	12.3	2.1	2.1	12.3	0.7	10.8	59.6
Singapore	25.4	59.1	10.2	0.0	0.0	0.6	4.6
Thailand	35.1	38.7	6.3	3.1	0.9	1.2	14.6
Indonesia	62.6	0.0	0.0	5.8	0.0	0.0	31.7

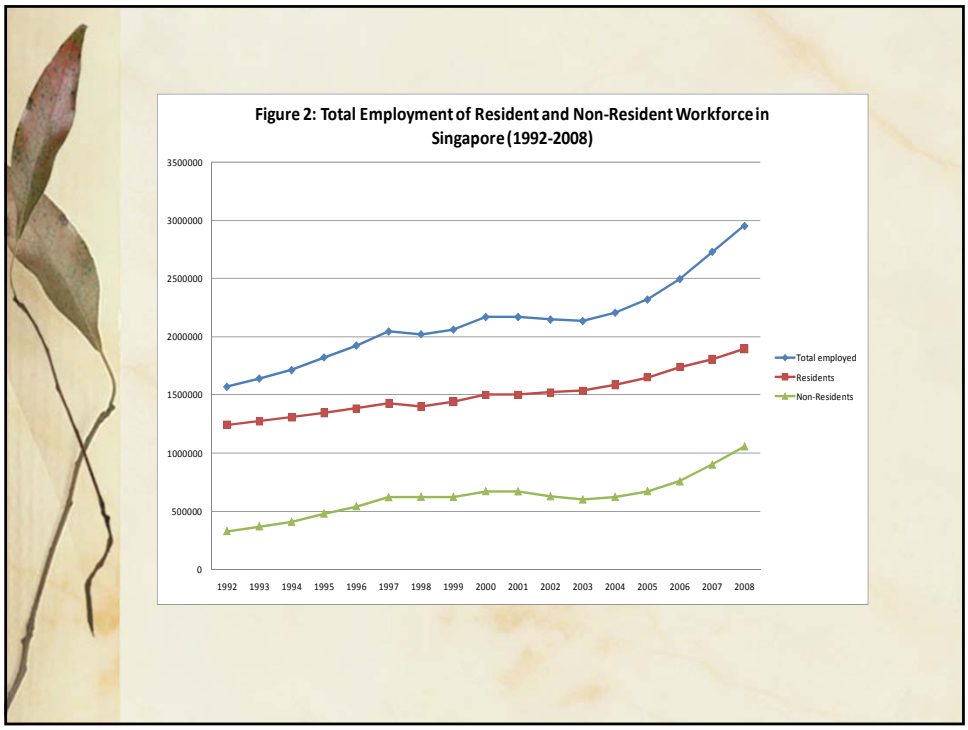
Source: World Bank

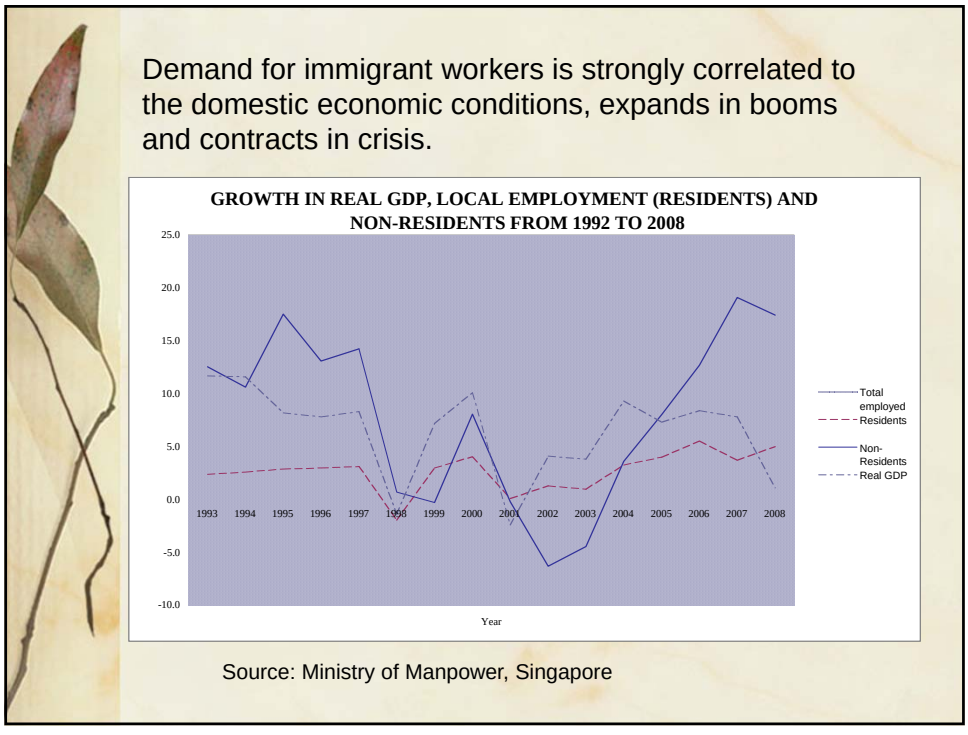
Singapore Foreign Manpower Policy

- Augment domestic human capital and innovation – "costless" human capital – Stark and Wang (200w), Thangavelu and Chander (2005)
- Skilled gap – Demand for skills rising faster than supply
- Support industrial policy – Services Sector (Casino), FDI
- Population augmentation
- Build infrastructure – Casino, Buildings
- Keep services cost low (?)

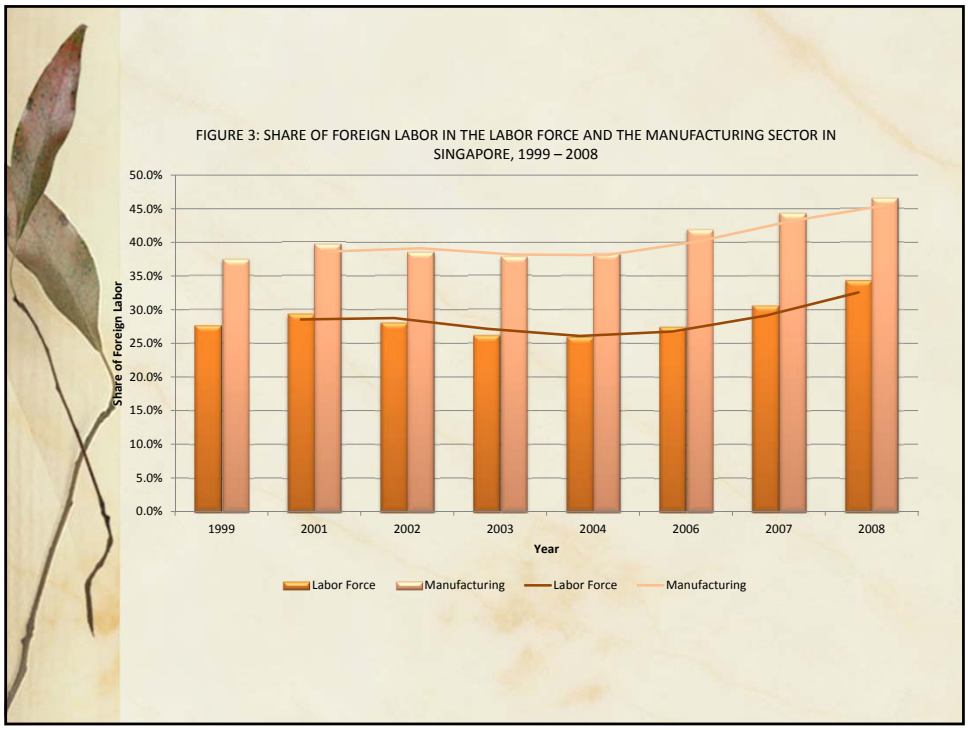
Singapore Foreign Manpower Policy

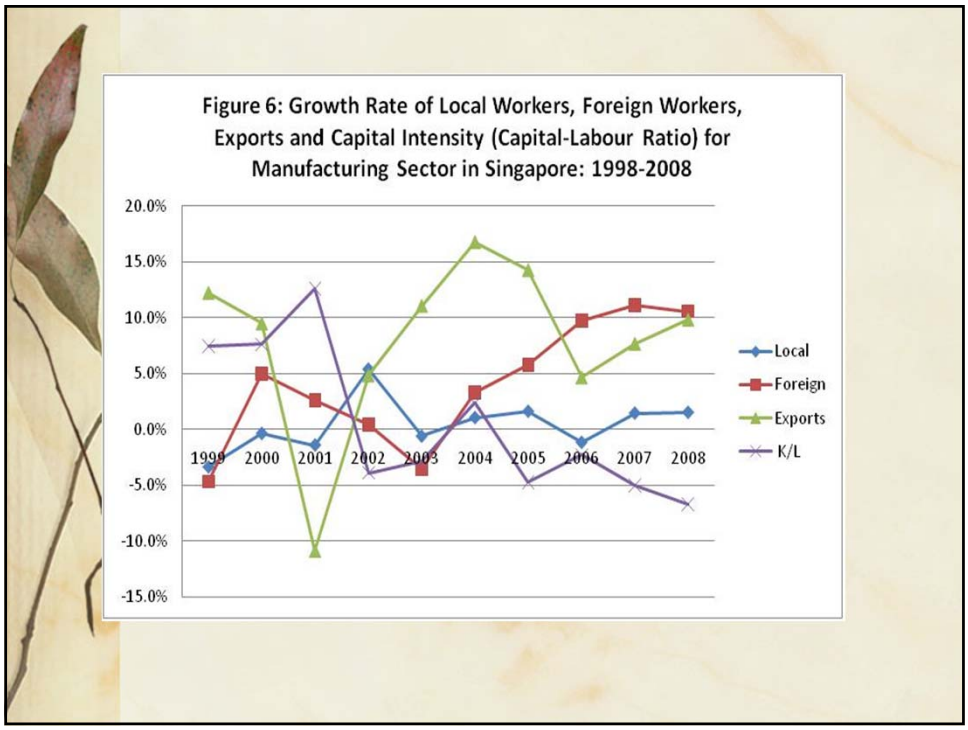
- Attracts low-skilled foreign workers to manage the "hollowing-out' effects of multinationals
- Unskilled foreign workers are seen as one way to keep the cost of production down and manage the dislocation of multinationals in the domestic economy (see Chia, Thangavelu and Toh, 2004)

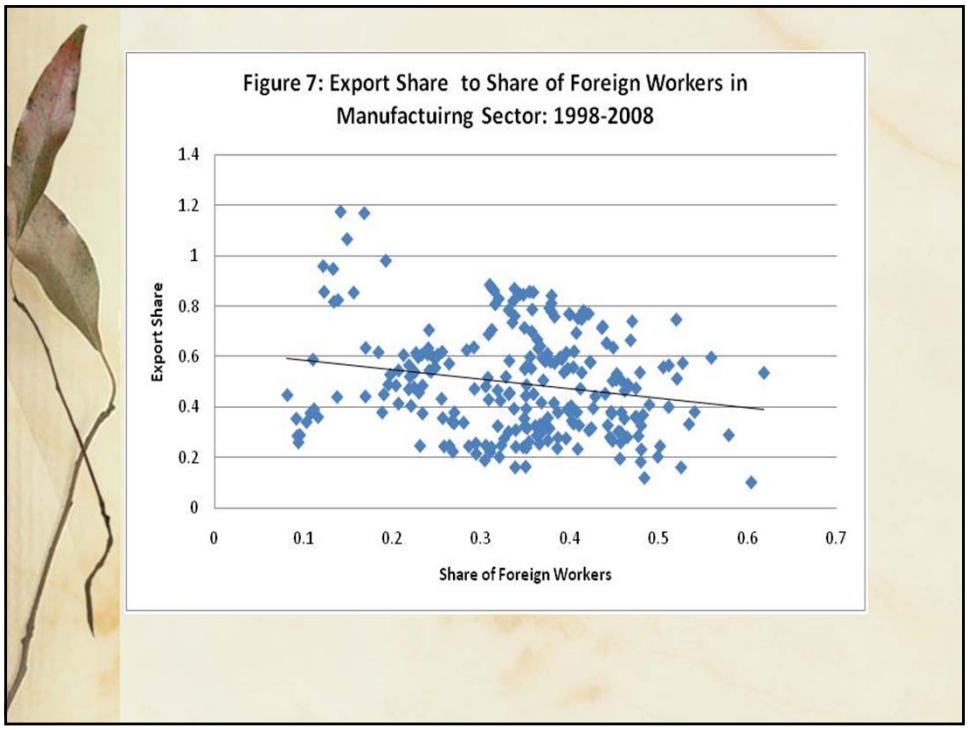


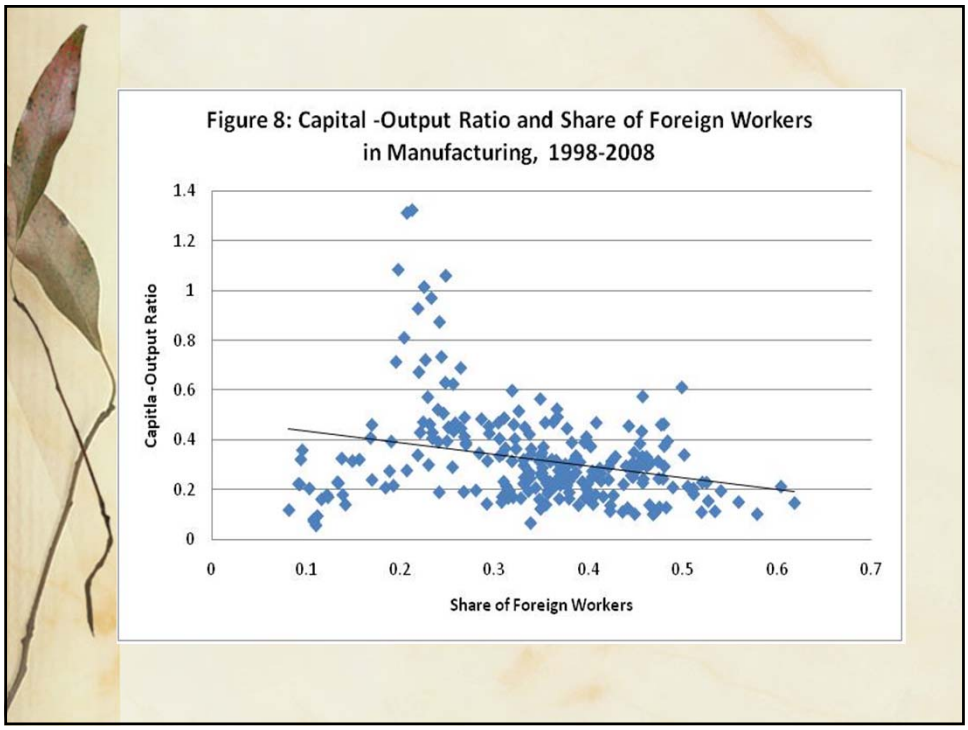


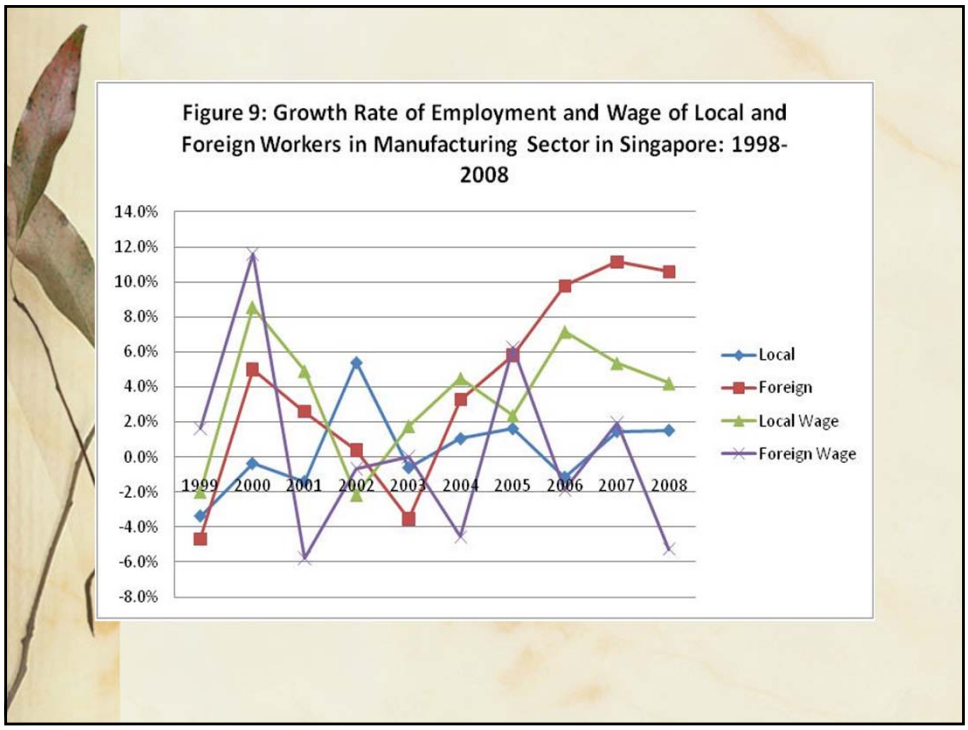
Source: Ministry of Manpower, Singapore











Policy Consideration

- What are growth impacts of immigrants?
- Should we reduce skilled foreign workers and increase unskilled foreign workers?
- Should we reduce unskilled foreign workers and increase skilled foreign workers?
- What are the structural adjustments from foreign manpower policy?
- New growth equilibrium?

Model

Follow the DLLP's (2007) three-sector general equilibrium model:

- Labour-intensive service sector (s) - homogenous good, competitive
- Capital-intensive manufacturing sector (m) - differentiated goods with growing varieties, monopolistic
- High-technology innovative sector (*i*) - R&D activities for new product development, not for direct consumption
- 3 types of Inputs - Skilled (*H*), Unskilled (*L*), Physical Capital (*K*)

Calibration based on Singapore Economy

List of parameters used in our baseline calibration.

Parameters	Values	Sources
δ	0.1	Canova et al (1994, 1996, 2000)
α	0.7	Keuschnigg and Kohler (1999)
ρ	0.01	Levine, Lotti and Pearlman (2003)
ϕ_i	1.18	Levine, Lotti and Pearlman (2003)
σ	0.4	Ogaki and Reinhart (1998)
$\theta_s,\ \theta_y = 1-\theta_s$	0.44, 0.56	Calibrated
$\gamma_{1s},\ \gamma_{2s}$	0.43, 0.88	Calibrated
$\gamma_{1m},\ \gamma_{2m}$	0.5, 0.8	Calibrated
$\gamma_{1i},\ \gamma_{2i}$	0.47, 0.72	Calibrated

Simulation based on Singapore Economy

- Focus on the steady-state
- Keep the factor shares of the native labour unchanged
- Keep the factor shares of the physical capital unchanged
- Alter the skill-composition within the immigrant workforce

Simulation 1: Large Unskilled Workers and Low Growth

Simulation 1: Lower Capital Intensity and Higher Share of Foreign Workers

- **Key Parameters**

	Simulation 2	Simulation 1	Remarks
Factor Shares			
Services: Unskilled	0.21	0.43	Reduced
Services: Skilled	0.25	0.50	Reduced
Services: Capital	0.52	0.07	Increased
Manufacturing: Unskilled	0.26	0.40	Reduced
Manufacturing: Skilled	0.21	0.50	Reduced
Manufacturing: Capital	0.53	0.10	Increased
Innovative: Unskilled	0.1	0.30	Reduced
Innovative: Skilled	0.18	0.50	Reduced
Innovative: Capital	0.71	0.20	Increased
Foreign Employment Share	0.30	0.40	Reduced

Simulation 1: Lower Capital Intensity and Higher Share of Foreign Workers (40% Employment Share)

FIGURE 1 STEADY STATE GROWTH RATE WITH HIGH UNSKILLED

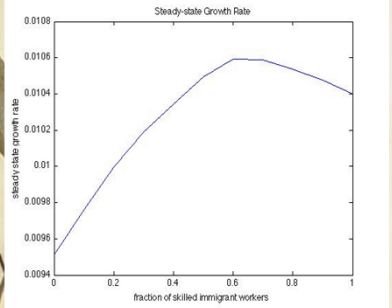
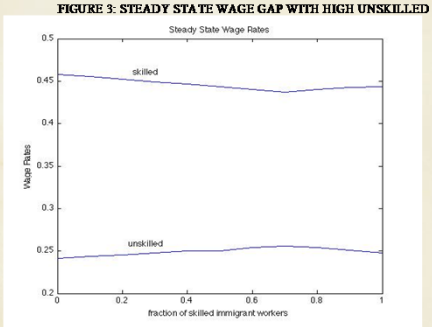


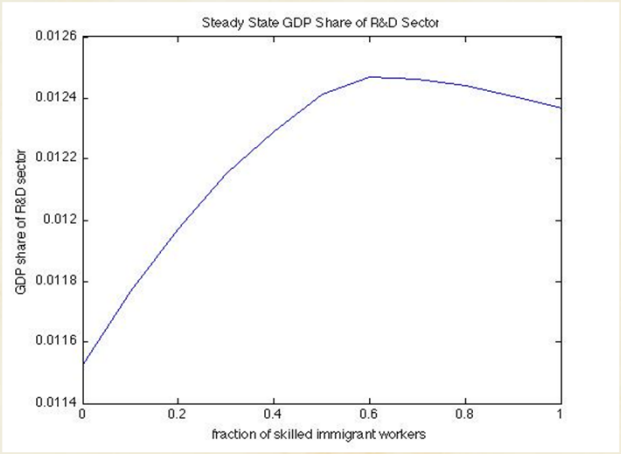
FIGURE 3: STEADY STATE WAGE GAP WITH HIGH UNSKILLED



- Growth driven by the innovation sector
- Diminishing Impact of Skilled Foreign Workers: Threshold level
- Threshold level determined by Capital Share (stock)

Innovative Sector

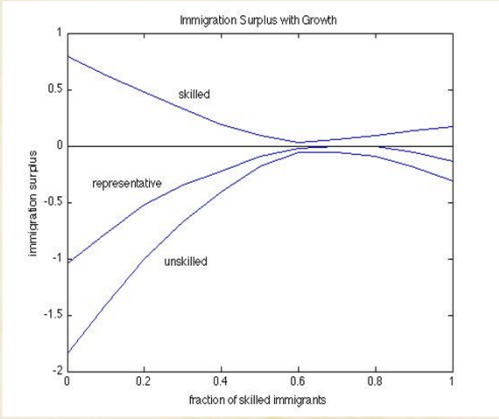
FIGURE C.2 STEADY STATE GDP SHARE OF R&D SECTOR



Size of the R&D sector increases at a diminishing rate, and started to decline when the fraction of the skilled immigrants exceeds a threshold of 60%.

Immigration Surplus

FIGURE C.4 IMMIGRATION SURPLUS WITH GROWTH



The size and sign of IS differs by their respective skill types.

Moderating Foreign Workers, Increasing Capital Intensity and High Growth

Simulation 2: Economy with High Capital Intensity and Innovation

- **Key Parameters**

	Simulation 1
Factor Shares	
Services: Unskilled	0.21
Services: Skilled	0.25
Services: Capital	0.52
Manufacturing: Unskilled	0.26
Manufacturing: Skilled	0.21
Manufacturing: Capital	0.53
Innovative: Unskilled	0.1
Innovative: Skilled	0.18
Innovative: Capital	0.71
Foreign Employment Share	0.30

Counterfactual Simulation 2: Higher Capital Intensity and Lower Share of Foreign Workers

- **Key Parameters**

	Simulation 2	Simulation 1	Remarks
Factor Shares			
Services: Unskilled	0.21	0.43	Increased
Services: Skilled	0.25	0.50	Increased
Services: Capital	0.52	0.07	Reduced
Manufacturing: Unskilled	0.26	0.40	Increased
Manufacturing: Skilled	0.21	0.50	Increased
Manufacturing: Capital	0.53	0.10	Reduced
Innovative: Unskilled	0.1	0.30	Increased
Innovative: Skilled	0.18	0.50	Increased
Innovative: Capital	0.71	0.20	Reduced
Foreign Employment Share	0.30	0.40	Increased

Results:

Figure 5: STEADY STATE GROWTH RATE WITH LOW UNSKILLED

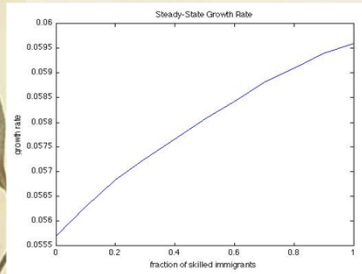


FIGURE 6: STEADY STATE WAGE GAP WITH LOW UNSKILLED

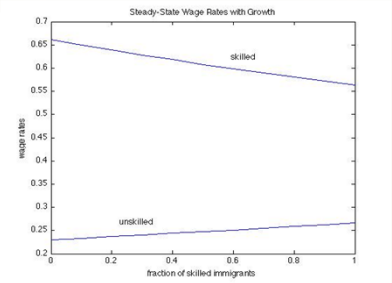
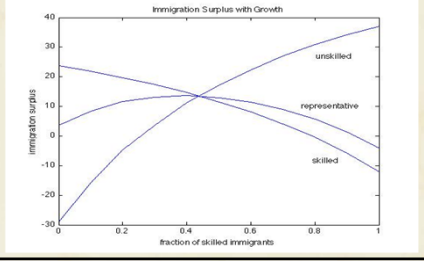


FIGURE 7: IMMIGRATION SURPLUS WITH GROWTH AND LOW UNSKILLED



Result Summary

- Skilled immigrants do exert positive effect but at a diminishing rate (suggest that we need to invest on local human capital)
- Skilled immigrants tend to encourage more research activities in the economy and hence promote long-term growth
- Maximum threshold level of the steady-state growth rate is achieved when the fraction of skilled immigrants is approximately two third of the total immigrant workforce
- Singapore: moderating the flow of unskilled foreign workers and increasing the flow of skilled foreign workers will have positive impact on the steady-state growth
- Moderating foreign manpower to around 30% share of total employment seems appropriate

Result Summary

- The wage gap narrows down initially when allowing more skilled immigrants enter the native economy
- Greater substitution of the skilled for unskilled workers occur due to the increase in the supply of skilled immigrants
- Widening of the wage gap appears when the fraction of skilled immigrants and the economic growth reaches a threshold stage
- Potential ‘crowding-out’ effect on the physical capital and exert negative impact on the economy.
- Thus capital investment in technology becomes vital when we try to increase the share of the foreign talent in the local economy

Policy Conclusion

- Innovation sector is important (Do we have one?)
- Why do we need immigrants? We are good in managing foreign workers (levy and quota) but not clear on the long term impact of immigrants
- Need to balance skilled immigrants with indigenous technology and capital investments
- Social cost and infrastructure are not included in the analysis
- Alternative model with immigrants – skilled immigrants and innovation with institutions to re-distribute wealth to keep the income gap constant (Will the immigrants enjoy the re-distribution of wealth – Need for careful calibrations in policy)

Key Considerations

- Productivity and Capital Investments are important: Tradable and Non-Tradable Sectors
- Productivity should be targeted: Focus on key tradable and innovation sectors
- Difficult to achieve aggregate productivity growth: transition to services, SMEs and significant share of foreign workers

Key Considerations

- SMEs are important: Target at medium-sized enterprises potential to link up to ASEAN Integration and connectivity
- Policy to focus on Infrastructure and connectivity to ASEAN and Asia
- Retaining skilled and experienced foreign workers (30% share)
- Use quantity adjustments: increase in supply of skilled local (foreign) human capital to moderate wage gap (less distortions) – need time to accumulate

Thank You