

Face-to-Face Communication in Organisations

Diego Battiston,
Jordi Blanes i Vidal, Tom Kirchmaier

London School of Economics

To function effectively, organisations rely on fast, accurate communication.

- Hayek
- Simon
- others

A lot of theory

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A lot of theory

Very little evidence, even on basic questions

Question:

(Access to) More Communication \Rightarrow Team Productivity

- no field causal evidence on this
- difficult: measurement and endogeneity

(Access to) Face-to-Face Communication

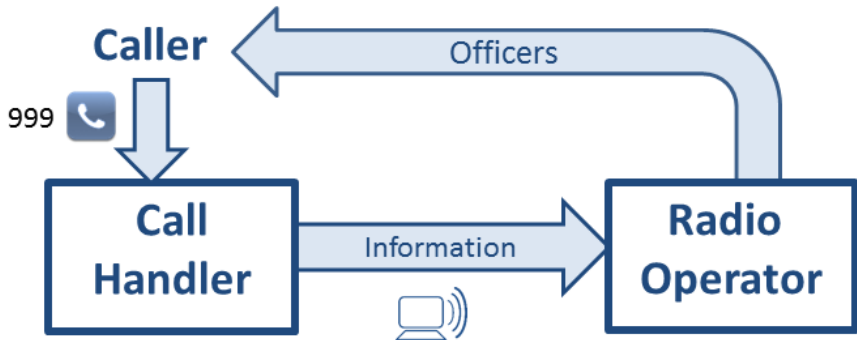
- ① how much does it increase productivity?
- ② is the effect different for different
 - tasks
 - workers
 - environment?
- ③ what are the costs/externalities?

This Paper: natural experiment in one organisation

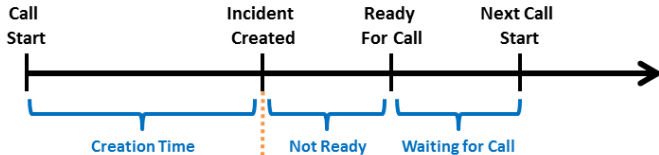
- co-location \Rightarrow productivity
- mechanism \Rightarrow face-to-face communication
- effects are very heterogeneous
- costs are real (but small)

Figure 1

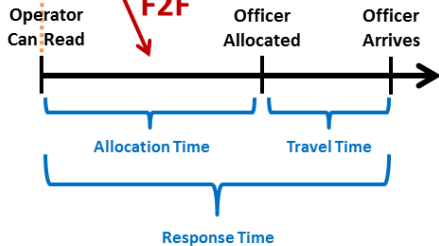
Operational Communications Branch



Handler



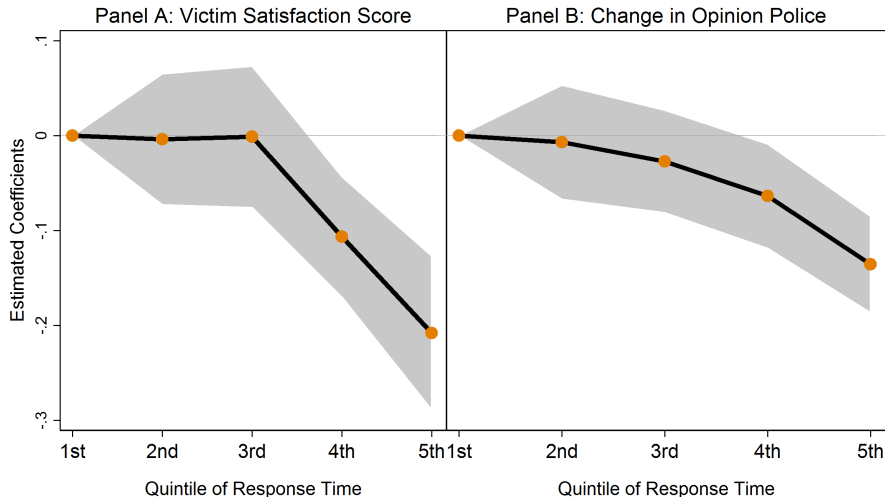
Operator



Performance Measure: Allocation/Response Time

- creation of incident to allocation/response of officer
- advantages
 - measured at incident level
 - predictor of caller satisfaction
 - UK Home Office has targets and evaluates forces

Figure 3: Correlation between Response Time And Victim Satisfaction



Each panel displays a different regression. The displayed coefficients are for the Quintiles of Response Time (the first quintile is added to aid visual analysis). 95% confidence intervals are displayed in the shaded grey area. All regressions control for Grade, Call Source, Year X Month X Day, Hour of Day, Division and Opening Code. Standard error are clustered at the Year X Division level.

Why Face-To-Face Communication?

- often, operator needs additional information
- assistant to help with that
 - call the caller
 - search in GMP datasets
 - contact handler electronically or **in person**

Figure 2
Location and Radio Operations Coverage of OCB Rooms

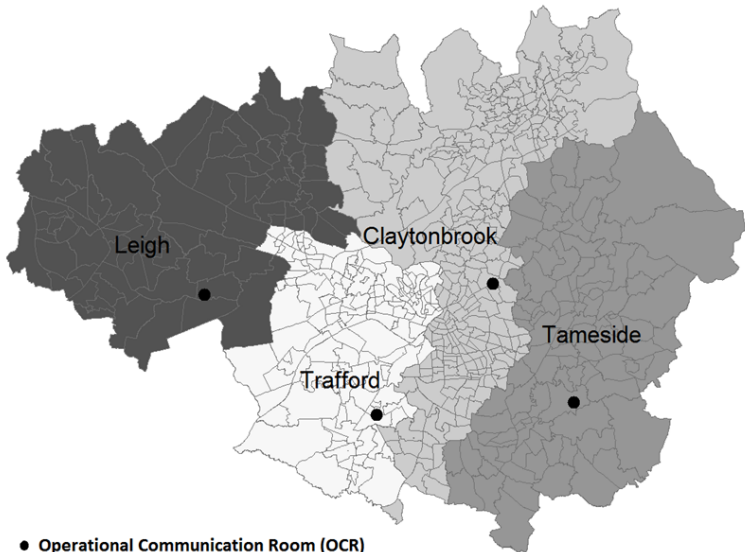


Figure 4B: Same Room = 0

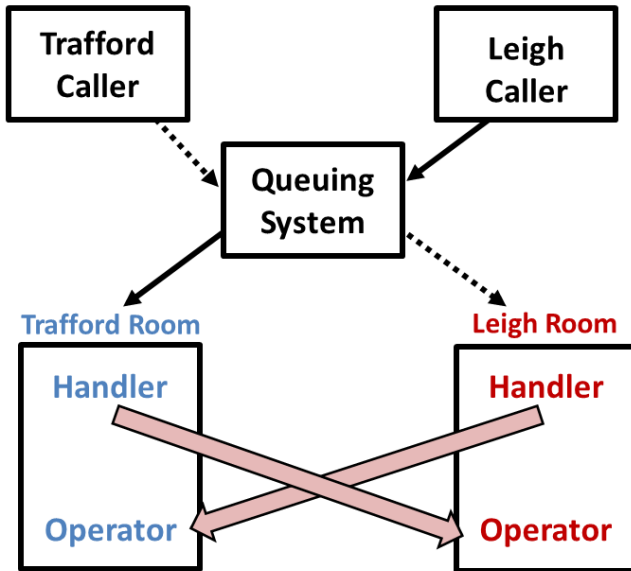
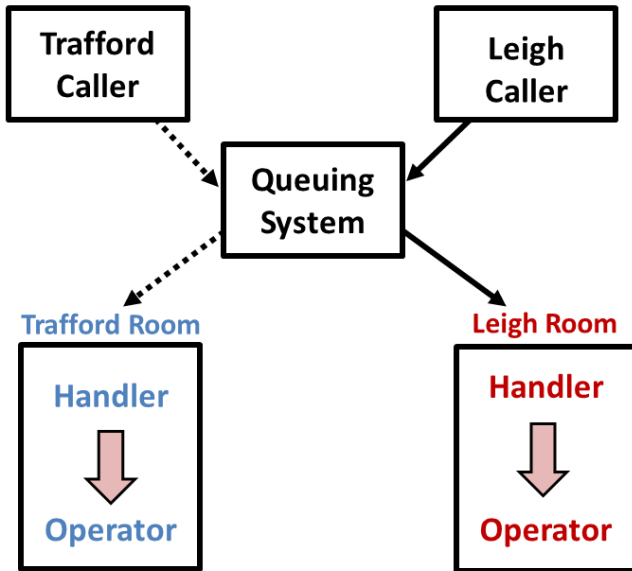


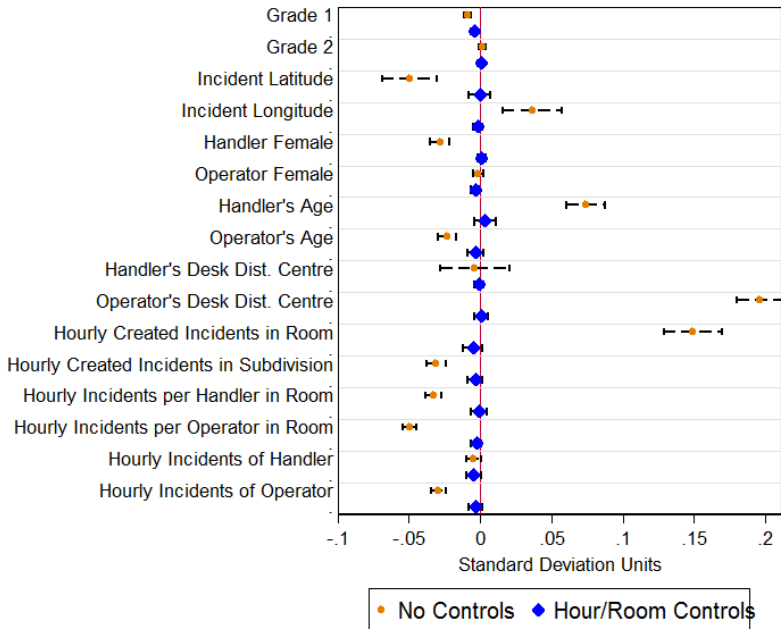
Figure 4A: Same Room = 1



Estimating equation:

$$y_i = \beta SAMEROOM_{j(i)k(i)} + \underbrace{\theta_{t(i)}}_{hour} + \underbrace{\xi_{l(i)} + \pi_{m(i)}}_{rooms} + \underbrace{\lambda_{j(i)} + \mu_{k(i)}}_{workers} + X_i + \epsilon_i$$

Identifying assumption: characteristics of incidents are uncorrelated with the characteristics of the handlers being allocated those calls by the router.



Plan of Results:

- ➊ baseline and by within-room distance
- ➋ mechanism
- ➌ heterogeneity
- ➍ cost of communication

TABLE 2: BASELINE ESTIMATES

Dep. Variable	(1) Log Alloc. Time	(2) Log Response Time	(3) On Target Alloc.	(4) On Target Response	(5) Cleared
Same Room	-.02*** (.004)	-.017*** (.003)	.004*** (.001)	.002*** (.001)	-.001 (.003)

Figure 6: Example of OCB Room Floorplan

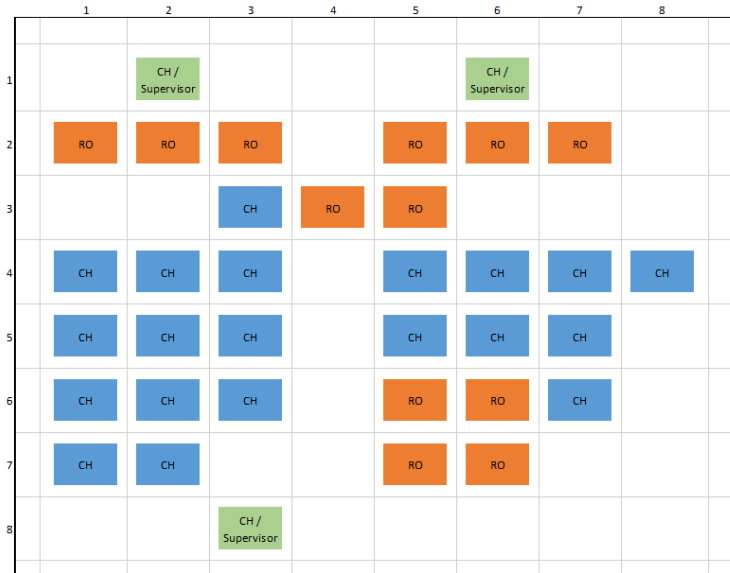


Figure 6: Heterogeneity of the Effect of Same Room
By Distance Inside Room

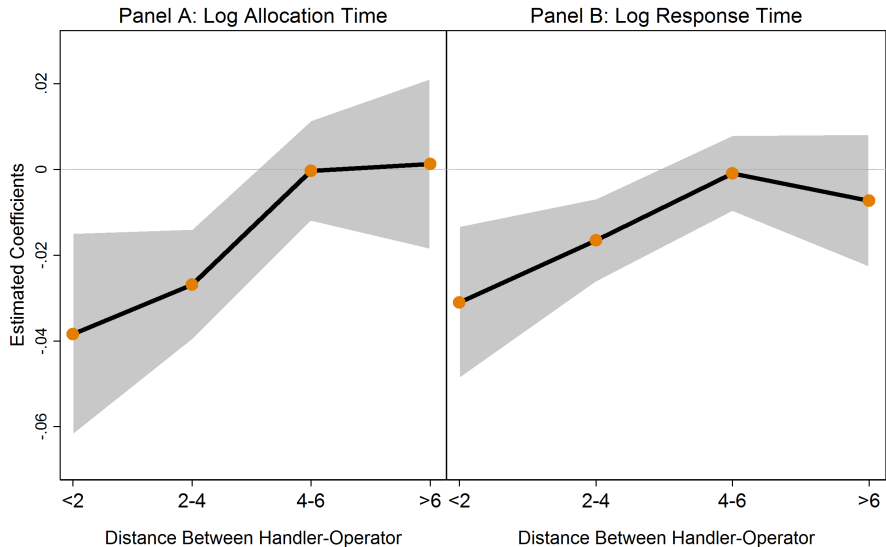


TABLE 3: HETEROGENEITY OF SAME ROOM
BY DISTANCE INSIDE ROOM

Dep. Variable	Individual F.E.		Pair F.E.	
	(1) Log Alloc. Time	(2) Log Response Time	(3) Log Alloc. Time	(4) Log Response Time
Same Room	-.049*** (.012)	-.035*** (.01)	- -	- -
Same Room	.026***	.018***	.027***	.017**
X Log Distance	(.009)	(.007)	(.01)	(.008)

Plan of Results:

- 1 baseline and by within-room distance
- 2 **mechanism**
- 3 heterogeneity
- 4 cost of communication

**Preferred Interpretation \Rightarrow Face-to-Face
Communication**

Alternative Explanations:

- co-location is a proxy
 - for handler/operator match
 - for handler/incident match
- more importance to co-located incidents
 - by operator
 - by handler

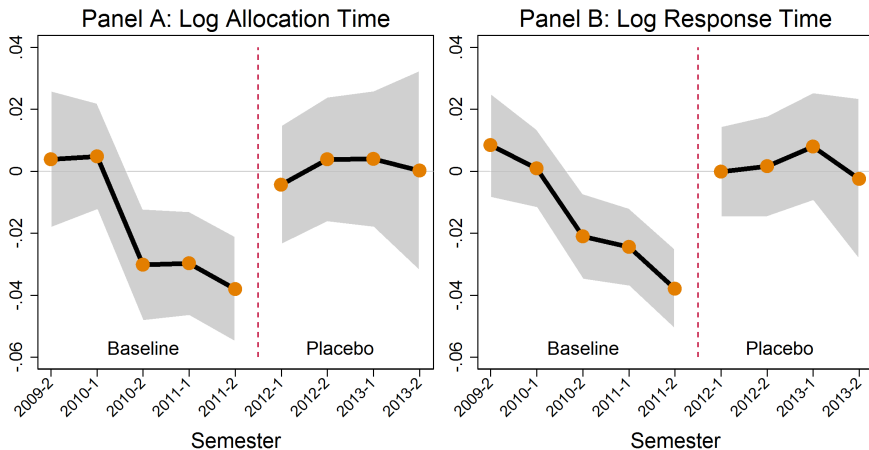
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 - for handler/operator match
 - for handler/incident match (but control for pair)
- more importance to co-located incidents
 - by operator
 - by handler

Figure 8: Heterogeneity of the Effect of Same Room By Semester, Including Placebo Period



Each panel displays two different regressions. The displayed coefficients are for the interaction of Same Room (or Placebo Same Room) with the semester indicators. The samples on the left side of each panel are the baseline samples. The samples on the right side of each panel include observations from 2012/13, when all the Call Handlers were based in Trafford, and all the Radio Operators were based in Claytonbrook and Tameside. We regard the 2012/13 period as the placebo period. For this period, the Placebo Same Room variable is based on the Radio Operator and Call Handler locations during the second semester of 2011. All regressions include indicators for Grade, Call Source, Year X Month X Day X Hour of Day, Radio Operator Room, Call Handler Room, Radio Operator and Call Handler. Standard errors are clustered at the Year X Month X Radio Operator Room level.

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- more importance to co-located incidents
 - by operator (so negative spillovers)
 - by handler

**TABLE 4: INVESTIGATING SPILLOVERS
TO OTHER INCIDENTS, BY SAME ROOM INCIDENTS**

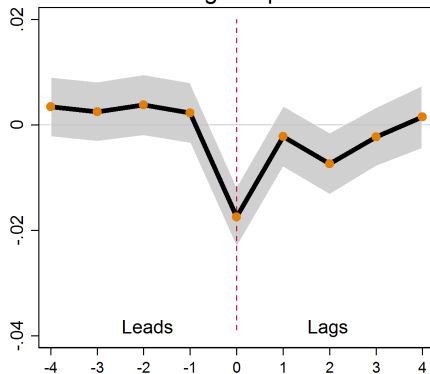
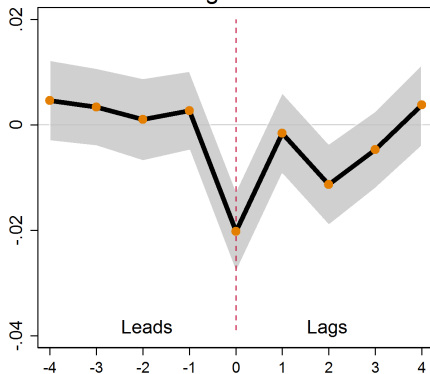
Spillovers during Period:				
Dependent Variable	60 min.	15 min.		
	(1) LogAlloc Time	(2) LogResp Time	(3) LogAlloc Time	(4) LogResp Time
% Same Room Incidents Received by Operator	.005 (.005)	.004 (.004)	.009 (.007)	.007 (.005)

Figure 9: Investigating Spillovers from Same Room Incidents to Other Incidents

Leads and Lags Around the Same Room Incident

Panel A: Log Allocation Time

Panel B: Log Response Time



Position re Same Room Incident

Position re Same Room Incident

Each panel displays a different regression. The displayed coefficients are for Same Room (position = 0) and four leads and four lags. The leads are the four incidents prior to the Same Room incident assigned to the Radio Operator. The lags are the four incidents following the Same Room incident. All regressions control for Grade, Call Source, Year X Month X Day X Hour of Day, Radio Operator Room X Year, Call Handler Room X Year, Radio Operator Identifier and Call Handler Identifier. Standard error are clustered at the Year X Month X Radio Operator Room level.

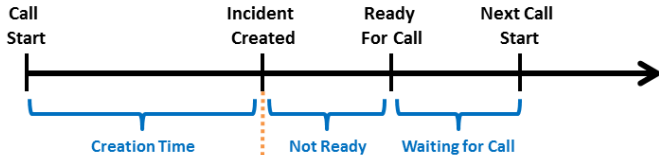
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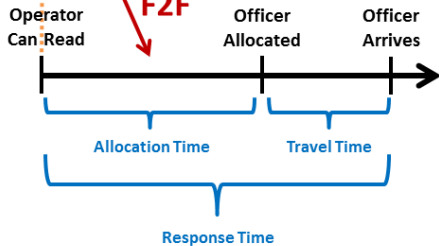
Alternative Explanations:

- co-location is a proxy
 - for handler/operator match
 - for handler/incident match
- more importance to co-located incidents
 - by operator
 - by handler (so better electronic communication)

Handler



Operator



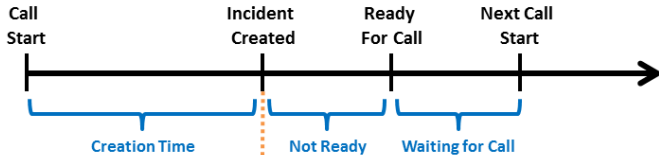
**TABLE 5: INVESTIGATING EFFECTS
ON OTHER ACTIONS BY THE HANDLER**

Dep.Var.	(1) Log Creation Time	(2) Log Number of Characters	(3) Log Number of Words
Same Room	.00446 (.00326)	-.0004 (.00138)	-.00028 (.0015)

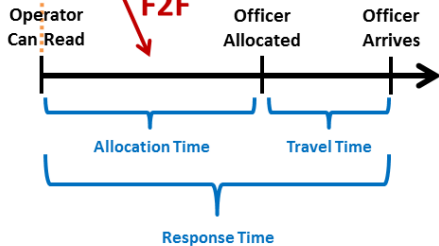
Indirect Evidence \Rightarrow Face-To-Face Communication

- F2F: handler not available to take new calls
- other mechanisms: handler available

Handler



Operator



**TABLE 5: INVESTIGATING EFFECTS
ON OTHER ACTIONS BY THE HANDLER**

Dep.Var.	(4)	(5)
	Log Not Ready	Not Ready > 0
Same Room	.02513*** (.00928)	.00443** (.00201)

Plan of Results:

- 1 baseline and by within-room distance
- 2 mechanism
- 3 **heterogeneity**
- 4 cost of communication

What type of incidents benefit more from co-location?

- information intensity
- urgency

Proxies:

- more information intensity if creation time higher
- more urgency if allocation time lower

**TABLE 6: HETEROGENEITY OF SAME ROOM
BY INCIDENT CHARACTERISTICS**

Dep. Variable	(1) Log Alloc. Time	(2) Log Response Time
Same Room	.001 (.008)	-.001 (.006)
Same Room X Urgent	-.019*** (.008)	-.007 (.006)
Same Room X Information Intensive	-.021*** (.008)	-.02*** (.006)

For what type of working environment is co-location more beneficial?

- workload of the operator

Use number of created incidents during the index hour

TABLE 7: HETEROGENEITY OF SAME ROOM
BY WORKER WORKLOAD

Dep. Variable	(1) Log Alloc. Time	(2) Log Response Time
Same Room	-.011* (.006)	-.008* (.004)
Same Room X High Operator Workload	-.018** (.008)	-.012* (.006)
Same Room X High Handler Workload	-.006 (.008)	-.01* (.006)
High Operator Workload	.128*** (.005)	.046*** (.004)

For what type of teams is co-location more beneficial?

- homogeneous (age, gender)
- longer history of working together

TABLE 8: HETEROGENEITY OF SAME ROOM

Dep. Variable	(1) Log Alloc.	(2) Log Response
Same Room	-.021 (.023)	-.031* (.018)
Same Room X Same Gender	-.016** (.008)	-.019*** (.006)
Same Room X Log Difference in Age	.025*** (.005)	.024*** (.004)
Same Room X Log Number Past Interactions	-.021*** (.005)	-.019*** (.004)
Same Room X Log Handler Experience	-.004 (.004)	-.003 (.003)
Same Room X Log Operator Experience	.005 (.006)	.009* (.005)
Same Gender	-.002 (.004)	-.003 (.003)
Log Difference in Age	.013*** (.003)	.01*** (.002)
Log Number Past Interactions	-.073*** (.005)	-.061*** (.004)

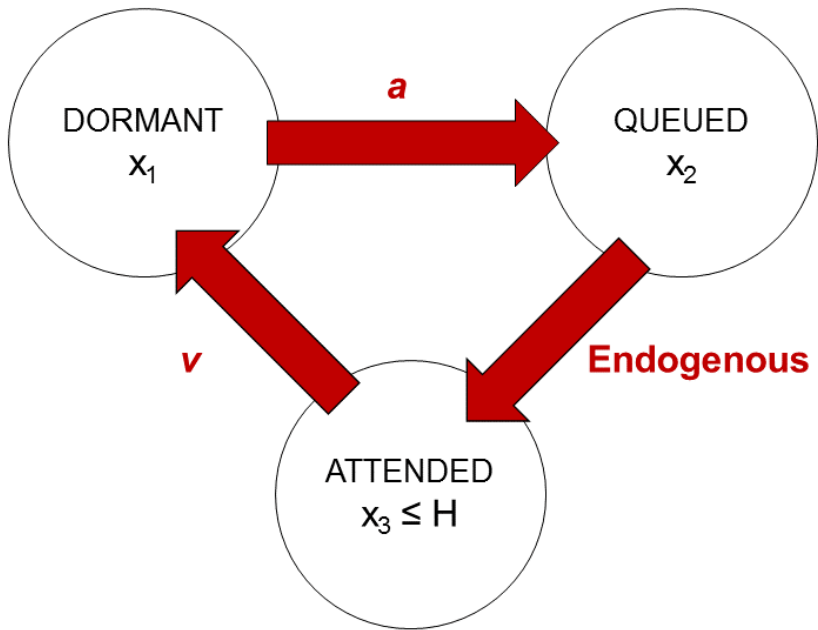
Plan of Results:

- ① baseline and by within-room distance
- ② mechanism
- ③ heterogeneity
- ④ cost of communication

Communication has Opportunity Costs

- because not doing something else
- the cost is the value of that something else
- it is rare the setting where this can be measured

2.5% not ready time \Rightarrow maybe more queuing time incoming calls



Predictions about Steady State Duration q^* :

$$q^* = \begin{cases} \frac{(1-H)}{vH} - \frac{1}{a} & \text{if } H < \frac{a}{a+v+av} \\ 1 & \text{if } H \geq \frac{a}{a+v+av} \end{cases} \quad (1)$$

- higher if v lower, H lower, a higher
- the effect of v depends on H

We estimate:

$$q_i = \alpha + \gamma n_i(\tau) + \delta h_i(\tau) + \beta d_i(\tau) + \epsilon_i \quad (2)$$

Queuing time for call i depends on:

- number of incoming calls
- number of handlers on duty
- average duration of recent incidents

TABLE 9: OPPORTUNITY COST
OF HIGHER CALL DURATION

	(1)	(2)	(3)
Dep. Var. =	15 min.	30 min.	60 min.
Log Queuing Time	Window	Window	Window
Panel A: All			
Log Calls	.843*** (.005)	.832*** (.006)	.734*** (.006)
Log Handlers	-.881*** (.007)	-.872*** (.007)	-.773*** (.008)
Log Avg Call Duration	.582*** (.008)	.819*** (.01)	.959*** (.011)
Panel B: High Organisational Slack			
Log Calls	.301*** (.008)	.35*** (.009)	.379*** (.01)
Log Handlers	-.308*** (.01)	-.368*** (.011)	-.418*** (.012)
Log Avg Call Duration	.402*** (.009)	.603*** (.011)	.776*** (.014)
Panel C: Low Organisational Slack			
Log Calls	1.827*** (.018)	1.664*** (.02)	1.48*** (.021)
Log Handlers	-1.653*** (.018)	-1.514*** (.02)	-1.326*** (.02)
Log Avg Call Duration	.941*** (.013)	1.184*** (.016)	1.272*** (.018)

So what is the cost?

- mean of not-ready time = 66 seconds
- 2.5% of that
- effect of one extra second of a call is

$$\hat{\beta} \sum_{i=j+1}^{j+K} \frac{\exp(q_i)}{TD_i} = .13$$

$$Cost = .13 \times 2.5\% \times 66 = .21 \quad (3)$$

The cost seems smaller than the benefit ($2\% \times 3840 = 76$)

Conclusion: is this a big effect?

- what is the prior?
- public sector productivity low
- heterogeneity important
- higher than operational costs