At the Onset of Original Capital Accumulation

M. Rota\textsuperscript{1} L. Spinesi\textsuperscript{2}

\textsuperscript{1}Sapienza, University of Rome
\textsuperscript{2}University of Rome 3

FRESH Meeting
Faculty of Economics
University of Valencia
13-14 June 2013
Olden development economists (Rostow 1960, Gerschenkron 1962) and Marxian scholars (Dobb, 1946) advanced the idea that an original capital accumulation is the precondition for the take-off of per capita GDP in the Western economies. This matters also for the current developing countries.

The phase of original capital accumulation is associated to an early rise of income per capita which prepares the future take-off based on technology, institutions and human capital accumulation (Galor and Weil 2000, Hansen and Prescott 2002, Voightlander and Voth 2006).
Our focus is on the pre-industrial growth of British manufacturing sector.

Our contribution copes with the modeling of the transition from feudal economy to the earlier capitalistic production.

We use an endogenous explanation taking into account the behaviour of a particular class of capitalists: the merchants-entrepreneurs.
From medieval times to late XV centuries Merchants guilds exerted a market power in both labour market and manufacturing production in the urban centres (Epstein 1998, Ogilvie 2011).

The influence of Guilds was ineffective in the countryside very close to the burgs because of competition among towns for the control of the countryside.

Merchants in the XV century began to move production from burgs to the countryside to escaping from guilds regulation and saving on labour cost: putting out system or protoindustrialization (Mendels 1972)
In the countryside labour was cheaper because peasants combined income from manufacturing with agricultural production for self-consumption.

Households of the countryside maximize their labor effort by splitting time between agriculture and manufacturing in order to achieve the subsistence (Kriedte et al. 1981).

The decentralization of production mainly concerned the low and medium quality productions of the textile sector which were at the core of the future industrial revolution.

Other productions (luxury and high quality goods) were produced in the towns while iron industry developed after 1750.
Population and preferences

- OLG model with bequests where individuals live for two periods.
- Population is constant and divided in two groups: workers (w) and merchants (m).
- Each worker is endowed with one unit of labor supplied inelastically. Production takes place in the second period.
- In the second period individuals obtain income, choose consumption and leave capital bequest.
- Preferences of a worker and merchant born at time $t$ are respectively:

$$u_{wt} = \ln c_{t+1}$$  \hspace{1cm} (1)

$$u_{mt} = \delta \ln c_{t+1} + (1 - \delta) \ln k_{t+1}$$  \hspace{1cm} (2)

where $c_{t+1} = c^A + c^M_{t+1}$, and $c^A$ is the exogenous and constant subsistence of food.
Countryside nearby burgs (outside the large farmlands): land with heterogeneous fertility $G_j$ is free. Enclosures are not massive until the late XVII century (e.g. Clark 2004 and 2007).

The agricultural and manufacturing production are given by:

$$Y_{jt}^A = (G_{jt}L)^{1-\gamma} \left[ E^C I_{jt} \right]^\gamma$$ (3)

$$Y_{jt}^{MC} = \left[ (1 - \eta_{jt}) K_t \right]^{1-\gamma} \left[ E^C \beta_{jt} \right]^\gamma$$ (4)

where $\beta_{jt} + I_{jt} = E^C = 1 \Rightarrow \beta_{jt}$ is the share of labor endowment an individual employees in the manufacturing sector. $(1 - \eta_{jt})$ is the share of capital employed in land with fertility $G_{jt}$.

Results hold with different CD parameters for $Y_{jt}^A$ and $Y_{jt}^{MC}$. 

M. Rota, L. Spinesi At the Onset of the Original Capital Accumulation
Workers divide their labor time between agricultural and manufacturing by equalizing the respective marginal productivities.

$$\frac{\partial Y^A_{jt}}{\partial \left[(1 - \beta_{jt})\right]} = \frac{\partial Y^{MC}_{jt}}{\partial \beta_{jt}}$$ \hspace{1cm} (5)$$

optimal $\beta_{jt}$ is determined as:

$$\beta^*_{jt} = \frac{(1 - \eta_{jt}) K_t}{(1 - \eta_{jt}) K_t + G_{jt} L}$$ \hspace{1cm} (6)$$
Manufacturing production in town is:

\[ Y_t^{MT} = (\eta_t K_t)^{1-\gamma} \left( w^T \right)^\gamma \]  

(7)

where \( \eta_t = \int_0^{J_t} \eta_{jt} \, dj \)

Merchants pay a fixed flow sunk cost \( F \) to the guild. So that:

\[ F = (1 - \gamma)(1 - \phi) \, Y_t^{MT} \]  

(8)
Given $K_t$, a merchant allocates capital between town and countryside by equalizing the respective marginal productivities

$$\frac{\partial Y_{t}^{MT}}{\partial \eta_{jt}} = \frac{\partial Y_{t}^{MC}}{\partial (1 - \eta_{jt})}$$

(9)

the optimal optimal $\eta_{jt}^*$, $\forall J_t$, i.e., $\forall G_{jt}$ is obtained.

Implication: a merchant will employ a higher share of each unit of capital in lands with lower fertility, for any given level of aggregate capital.
the fundamental law of motion for capital

\[ K_{t+1} = \phi (1 - \delta) (1 - \gamma) K_t^{1-\gamma} \left[ \left( \int_{0}^{J} \beta_{jt} w_t^C \right) + (w_t^T) \right]^{\gamma} \]  

(10)

The problem of evaluating labour:

- real wages (Clark 2005). Incorporating technological advances by mean of real wages, at least in the shape of labor augmenting technology
- subsistence level (Beveridge wages assessment) No technological advances are incorporated
Capital accumulation over time—Preliminary estimates

M. Rota, L. Spinesi

At the Onset of the Original Capital Accumulation
Manufacturing production over time

- recalling aggregate manufacturing production
- comparing real data from Broadberry et al. (2011) with data generated by our model
- moderate increase in manufacturing production even before classical Industrial Revolution
- The British industrial economy escaped from the Malthusian trap in the Early Modern Epoch
Manufacturing production over time—Preliminary estimates

real value added in industry (1300=1)

estimated data (gamma=0.5)  observed data
Manufacturing production over time—very long run
Preliminary estimates

M. Rota, L. Spinesi
At the Onset of the Original Capital Accumulation
We replicate the original capital accumulation in the manufacturing industry in XV-XVIII century Great Britain through:

- Endogenous labor time allocation between agricultural and manufacturing in the countryside.
- Locational choices of supply of labour in town and countryside.
- Locational choices of capital in town and countryside in manufacturing by merchants.

One implication is that original capital accumulation was necessary but not sufficient condition for manufacturing production take-off.

Candidate explanations for taking-off (Institutions, Human Capital, Technology) are needed to explain IR.

Hints for further researches: connections between original capital accumulation and candidate explanation for IR.