

Migration, Wages, and Tradition: Obstacles to Entrepreneurship in East Germany ^{*}

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Abstract

For the last decade, the East German economy has been suffering from high unemployment and low economic growth. Policy makers often point to the lack of entrepreneurship as one of East Germany's main problems. This paper addresses the question of how East Germany's integration into an established economy, West Germany, may have hindered a fruitful development of entrepreneurship and how this may have affected economic growth. I build a model economy that places Lucas's [1978] span-of-control model into an overlapping-generations framework. Following Hassler and Rodríguez Mora [2000] managerial talent is defined as a combination of two factors, intelligence and entrepreneurial parental background, and growth depends on the intelligence of entrepreneurs. In East Germany, the lack of entrepreneurial parental background makes intelligence the decisive factor in occupational choice and more intelligent entrepreneurs should contribute to high growth rates. However, three key aspects of its integration into West Germany inhibit this mechanism: 1) the unrestricted mobility of East Germans to the West, 2) the policy of fixing East German wages as fractions of West German wages, and 3) the importance of family tradition for entrepreneurship in West Germany. Counterfactual experiments show that eliminating any of these three aspects leads to more entrepreneurs, less unemployment, and higher economic growth in East Germany.

JEL classification: F15, E24, J22

Keywords: Entrepreneurship, Allocation of Talent, Social Mobility, Transition Countries

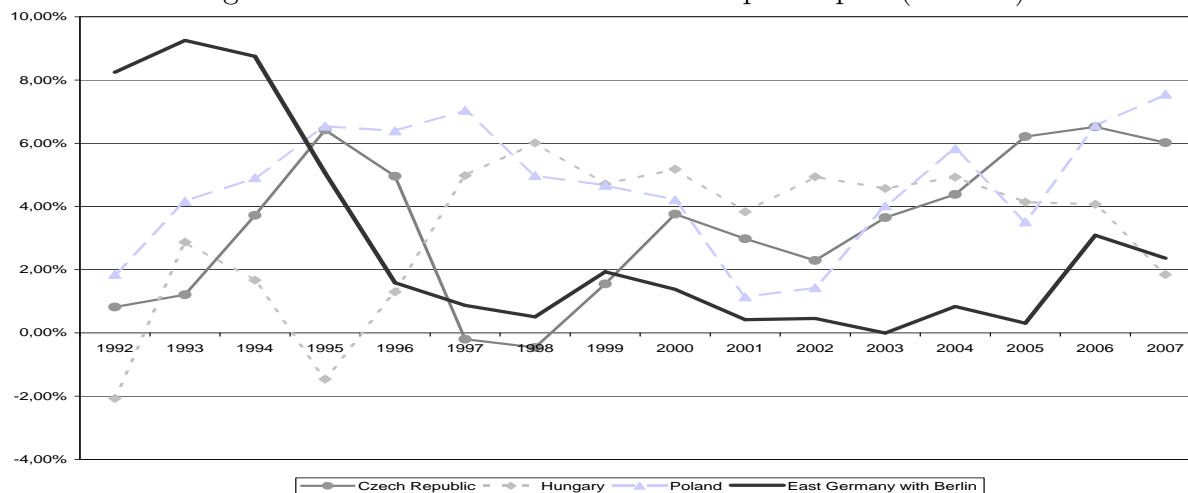
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1 Introduction

East Germany's economic performance has been quite dismal for the last decade. Since 1989, unemployment rates in East Germany and Berlin have been around 18 – 20% and twice as high as rates in West Germany (Bundesagentur für Arbeit [2006] and [2008]). Furthermore, while other transition countries such as the Czech Republic, Poland, and Hungary are growing to catch up with the rest of Europe, East Germany's economy is stagnating. Its GDP per capita remains below 70% of West Germany's. For the last decade, East Germany's economy has grown more slowly than the economies of Poland, Hungary, and the Czech Republic (see Figure 1.1).¹

Figure 1.1: Growth Rates of Real GDP per Capita (chained)



Data: Heston et al. [2009] and Statistische Ämter der Länder for East Germany [2009]

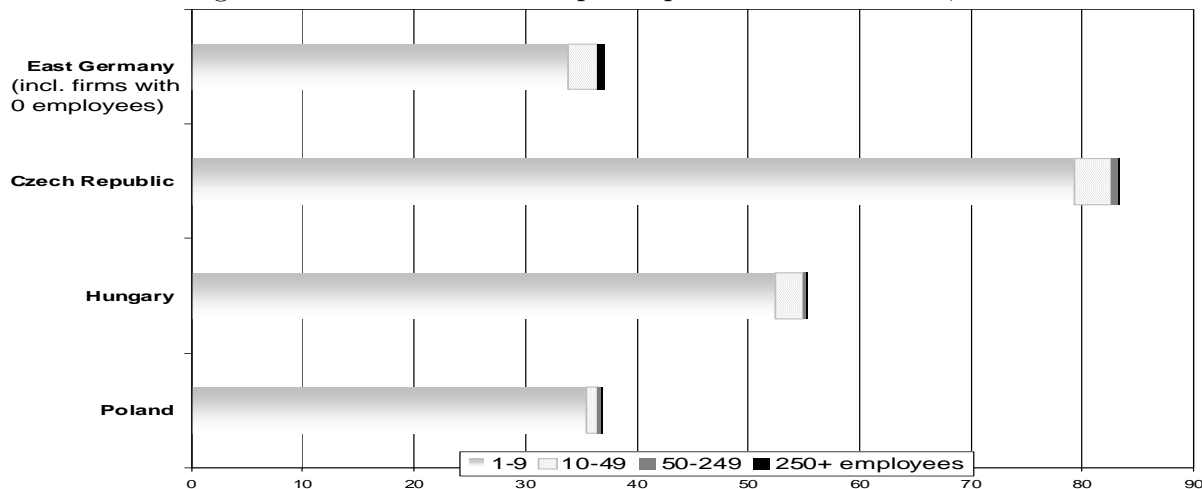
Policy makers have identified fostering entrepreneurship as the key to employment creation and economic growth in East Germany: “The Organisation for Economic Co-operation and Development (OECD) and its Local Economic and Employment Development Programme has been working with the Federal Ministry of Transport, Building and Urban Affairs (BMVBS) since 2005 on an analytical and practical project on Strengthening entrepreneurship in East Germany as a critical lever for economic growth and employment creation” (OECD [2007a]).

¹Accumulated growth rates for real GDP per capita for 1992 to 2007 for East Germany, Poland, Hungary, and the Czech Republic are 152%, 195%, 162%, and 163% respectively. Indeed, Slovenia's GDP per capita has already surpassed that of East Germany.

Numerous newspaper articles have pointed out that the development of the 'Mittelstand' – the small and medium sized enterprise sector– is essential for the revival of the East German economy. However, “in practice, the development of east Germany’s Mittelstand is proceeding painfully slowly. Self-employment is still much lower than in west Germany. Small businessmen in east Germany face a number of handicaps, mostly to do with being new to the game;” (The Economist [1996]).

Less than twenty years ago, private entrepreneurial activity was extremely restricted or even forbidden in East Germany, Czechoslovakia, Poland, and Hungary. However, today the lack of entrepreneurship seems to still persist in East Germany, while other transition economies have managed to overcome this hurdle.²

Figure 1.2: Number of Enterprises per 1000 Inhabitants, 2005



Data for East Germany: Statistisches Bundesamt [2008a] Others: Eurostat [2005] (NACE: C-I;K)

Figure 1.2 shows that there are significantly fewer enterprises in East Germany compared to Hungary, Poland, or the Czech Republic. In East Germany there are only 37 enterprises per 1000 inhabitants – this number includes firms with zero employment – while there are 83 firms per 1000 inhabitants in the Czech Republic.³

²In Hungary, liberalization of communist rules began in the 1970’s and by the 1980’s a so-called ‘second economy’ of privately owned businesses had developed. The private sector was officially non-existent in Czechoslovakia but more important in Poland where family farms dominated the agriculture (OECD [1992]).

³Number of firms per 1000 inhabitants in developed countries range from 14 in the US, to 20 in all of Germany (excluding firms with zero employment) to 26, 30, and 37 in the UK, Netherlands, or France respectively (OECD [2005]).

In 1990, with the end of the communist era, setting up a firm was legalized and simplified, opening up a whole new set of occupational choices in East Germany, the Czech Republic, Poland, and Hungary. There was, however, a significant difference between the other transition countries and East Germany, as the latter was integrated into the established economy of West Germany. In this paper I argue that three key aspects of East Germany's integration into West Germany hindered a fruitful development of entrepreneurship: migration possibilities to West Germany, the way East German wages were regulated upon reunification, and a strong tradition of family firms in West Germany.⁴

First, since 1989 the unrestricted mobility of East Germans has led to major migration flows within Germany. Between 1989 and 2002 net migration to West Germany amounted to 1.3 million people, an equivalent of 7.5% of the original population of the German Democratic Republic (GDR) (Heiland [2004]). The Czech Republic and Hungary, on the contrary were net recipients of migration during 1990-1998.⁵ Especially young and skilled East Germans are likely to migrate to West Germany (Hunt [2006a] and Ragnitz [2007]). Between 1995 and 2007, 19% of East Germans aged 18 to 29 left East for West Germany. Figure 1.3 shows that since 1998 East Germany has been losing 1-2% of its young population to migration each year.⁶

Second, presumably in order to restrict the number of East Germans migrating to West Germany, West German labor unions pressed for parity of East and West German wages (see e.g. Akerlof et al [1991], Sinn [2000]).⁷ In 1991, wages in East Germany were set to 50% of West German wages despite a lower ratio of East- and West German labor productivities. By 1995, East German wages had reached up to 70% and more of West German wages (Burda [2007], Sinn [2000], and Fuchs-Schündeln and Izem [2007]).⁸

Third, family tradition and entrepreneurial parental background was and is decisive for occupational choices of West Germans. Klein [2000] finds that only 39% of all German

⁴Formal aspects of doing business are actually more favorable in Germany than in other transition countries. However, as of 2009 starting a business is easier in the Czech Republic and Hungary than in Germany, mainly due to reduced number of days and procedures involved. (World Bank [2009])

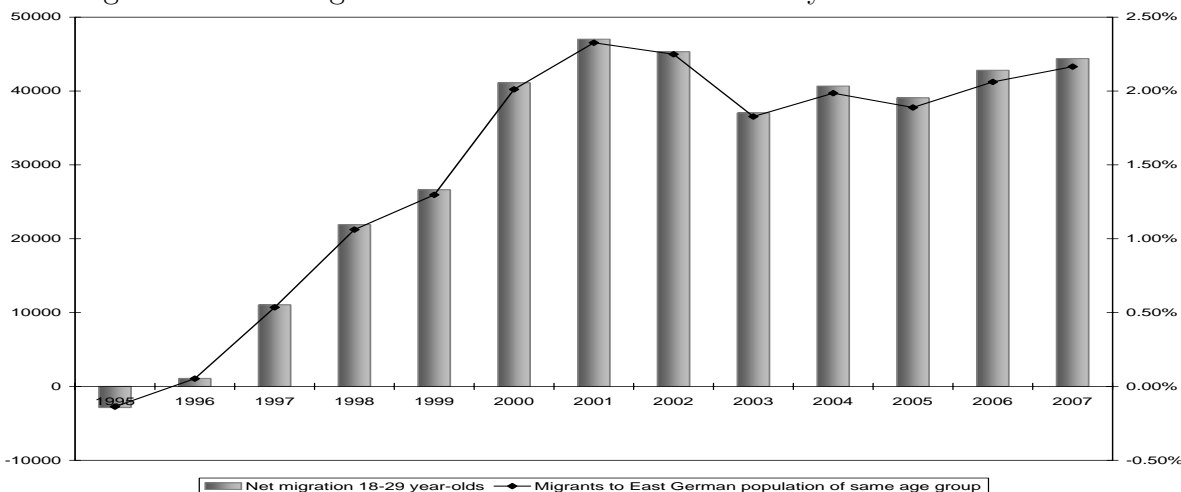
⁵Migration to the Czech Republic and Hungary was mainly from other transition countries. Poland lost population to migration between 1990 and 1998, but only around 0.5% or at most 3.9% of the original Polish population (United Nations [2002]).

⁶Compared to international migration rates, these are very large numbers; e.g. current annual net migration rates from Ecuador and Mexico are 0.8% and 0.4% respectively (CIA [2008]).

⁷Officially, labor unions demanded wage equity out of concern for East-West equity and Eastern welfare.

⁸Between 1990 and 1997, wages in Poland and the Czech Republic remained stable with respect to West German wages at around 10-20% (Sinn [2000]).

Figure 1.3: Net migration from East to West Germany for 18-29 Year-Olds



Data: Statistische Ämter des Bundes und der Länder [2007], excluding Berlin

family businesses are in their founder generations, many exist in their 4th or 5th generation.⁹ Contrariwise in East Germany there was no past generation that could pass on knowledge on how to run a business in the newly established market economy and despite abundant government aids only few individuals in East Germany set up their own business.¹⁰

The particular situation of East Germany, its poor economic performance, and the contrast between the other transition economies and East Germany raise several questions: Why do occupational choices of East Germans differ from occupational choices made by Hungarians or Czechs? And can these differences in occupational choices be linked to differences in economic growth? What role does each of the proposed key aspects of East Germany's integration into West Germany play? How do the unrestricted mobility of East Germans, the policy of fixing East German wages as fractions of West German wages, and the importance of entrepreneurial tradition in West Germany influence occupational

⁹In Germany family business make up between 50% (Klein [2000]) and 95% (IfM [2007]) of all companies. 75% of all Spanish family firms are in their founder generations. Also the UK and the Netherlands have more family businesses in their founder generation than Germany (Klein [2000])

¹⁰ Between 1991 and 2005, East Germany received annual public transfers equivalent to 4.1% – 5.4% of West German GDP. (Wurzel [2001], Hunt [2006b]). Transfers for support to enterprises and business-near infrastructure made up between 0.63% and 0.99% of West German GDP (Wurzel [2001]). According to Ragnitz [2002] in 2000 most firms in East Germany still received investment aids of around one quarter of their investment costs. Sinn [2000] even speaks of negative capital costs for investing in East Germany at the onset of transition.

choices of East Germans and thus economic growth?

In order to address these questions, both qualitatively and quantitatively, I build a model economy that places Lucas' [1978] span-of control model into an overlapping-generations framework. Individuals in the model economy are characterized by their innate intelligence and their parental background. Managerial ability is a combination of these two characteristics. Given their managerial ability individuals decide to be unemployed, to work, or to set up a business. The intelligence of entrepreneurs determines economic growth. Hence, there is a direct link between individuals' occupational choice and aggregate economic performance. After one generation each individual is replaced by a child of random intelligence. Children inherit bequests and in case their parent was an entrepreneur they also receive information about how to run a business. As in Hassler and Rodríguez Mora [2000], when technological growth is low, there are few changes in the business environment and past information about how to run a business is valuable. Managerial ability of children of entrepreneurs will be higher. They will be the ones to set up their own business, rather than the most intelligent individuals. Hence, talent is not optimally allocated, individuals' occupational choices exert a negative externality on economic growth and growth remains low. On the other hand, when technological growth is high, past information depreciates fast, and managerial ability will be determined by individuals' innate intelligence only. The most intelligent individuals become entrepreneurs, allocation of talent is optimal, the externality is positive and technological growth remains high.

The model is then extended to capture the integration of East into West Germany. While both Germanies share capital and goods markets, labor markets are locally separated. The government fixes wages in East Germany as fractions of West German wages and finances a lower rental rate of capital for East Germany. Individuals can pay a moving cost and work or set up a business in the other part of Germany. I first calibrate the basic model economy to West Germany before reunification pinning down the key parameters governing the role of parental background and the link between entrepreneurship and growth. These parameter values are then used for the extended version of the model economy.

Wages set above labor productivity make becoming an entrepreneur less attractive and East Germans choose to work instead of setting up their own business. While East Germans' general skills are comparable to those of West Germans, they lack any parental background in entrepreneurship.¹¹ Their average managerial skills are thus lower than

¹¹Dunn et al. [1997] find no significant differences in economic returns to college and vocational degrees

those of many West Germans who have learned from their parents how to run a business. Despite investment aids for setting up businesses in East Germany, the most intelligent East Germans migrate to West Germany to set up businesses there. They thus contribute to growth in West Germany, whereas in East Germany few mediocre entrepreneurs imply low economic growth. Given too many workers and too few entrepreneurs in an environment where wages are fixed, there is involuntary unemployment in East Germany.

Over time East and West Germany become more similar and relative moving costs decrease. Under the current integration scenario more and more East Germans migrate to West Germany. The result is a constantly shrinking East German population that is being reduced to immobile individuals. Counterfactual experiments show that had East Germany integrated into a social mobile West Germany, or had East German wages been flexible, or had migration between East and West Germany been restricted, there would be more entrepreneurs, less unemployment as well as higher economic growth in East Germany. However, while flexible wages and a social mobile West Germany would have also led to more output and higher economic growth for all of Germany, migration restrictions are exclusively beneficial to East German output and economic growth.

1.1 Related Literature

This paper builds on Hassler and Rodríguez Mora [2000]. The authors bring forward various empirical evidence on the negative relation between rates of technological and economic growth and the value of parental background that arises in the model of this paper and that has also been subject to a larger literature on economic growth, social mobility, and the allocation of talent.¹² According to this literature, entrepreneurial parental background has a positive effect on entrepreneurship on the individual level but negatively affects aggregate variables, as little intergenerational occupational and social mobility is associated with low economic growth.¹³ Caselli and Gennaioli [2006] provide

between West and East Germans working in West Germany. Krueger and Pischke [1995] estimate very similar coefficients for returns to years of schooling for West Germans and East Germans working in West Germany.

¹²A seminal paper on the optimal allocation of talent and economic growth is Murphy et al [1991]. Recently, the topic of the allocation of resources across productive units and its implications for productivity and growth has received a great deal of attention, see Hsieh and Klenow [forthcoming], Guner et al [2008] and Restuccia and Rogerson [2008] among others.

¹³There is a large empirical literature on the determinants of entrepreneurship. Having had a parent who was an entrepreneur is found to have a positive effect on oneself setting up one's own business. Dunn and Holtz-Eakin [1996] find intergenerational linkage in self-employment to be stronger along non-

a model where missing markets result in the prevalence of dynastic firms. As in this paper, managers being selected according to their family ties rather than their talent leads to lower total factor productivity. In Galor and Tsiddon [1997], similar to this paper, parental background and growth are negatively related and as technology adoption evolves, parental background gains importance, wages become more equal, and technological progress slows down. In the model of this paper a positive value for parental background in entrepreneurship inhibits an optimal allocation of talent that would maximize the externality of intelligent entrepreneurs on economic growth.

As in the recent literature on cross-border flows of managerial talent (such as Burnstein and Monge [2009], and Pica and Rodríguez Mora [2007]), the model of this paper allows for entrepreneurs to set up their business in the other part of Germany. However, unlike results in Burnstein and Monge [2009] managerial talent does not flow from West Germany, a region with large 'firm-embedded productivity' towards East Germany where labor is abundant, because East German wages are set above labor productivity. And even though the immediate implementation of West German regulations in East Germany makes both regions' entrepreneurial environments alike, West Germans do not set up businesses in East Germany. Managerial talent moving towards similar environments as in Pica and Rodríguez Mora [2007] is again obscured by the East German wage setting policy.

This paper is also related to the vast literature that discusses East Germany's disappointing growth experience. Hunt [2008] provides a recent review of this literature. There is a general consensus that the wage setting policy has been the main cause for East Germany's high unemployment rates (see e.g. Akerlof et al [1991] and Sinn [2000]). According to Snower and Merkl [2006] high unemployment rates in East Germany are a consequence of the wage setting policy in combination with generous welfare provisions. Canova and Ravn [1998] also assign an important role to welfare provisions in magnifying the contraction of output and employment caused by differences in skill level and capital endowment of East and West Germans. Burda and Hunt [2001] claim a dampening effect of the wage-setting policy on migration.¹⁴

This paper contributes to the literature by being the first one, to the best of my knowledge, that explicitly models the link between a lack of entrepreneurship and low economic

financial lines than along financial lines. Arenius and Minniti [2005] find that simply knowing other entrepreneurs is positively and significantly related to being a nascent entrepreneur.

¹⁴In addition, fixed wages impeded an offsetting of initial effects of the currency union between West and East Germany.

growth in East Germany.¹⁵ It applies the theory established by the literature on social mobility and economic growth to the context of economic transition. From the historical unique context of a generation without parental background in entrepreneurship arises the natural question of its implications for economic growth. This paper tries to address this question and to provide some quantification of the implications for the case of East Germany.

The remaining of this paper is organized as follows. Section 2 presents the basic model that is then calibrated to West German data before 1989. An extended version of the model that captures the reunification of East and West Germany is presented in Section 3. This extended model is then calibrated to data after reunification and its results are discussed. Section 4 presents the counterfactual experiments. Section 5 concludes.

2 Model

Each period the economy is inhabited by a continuum of individuals of mass one. Individuals differ in initial endowments of capital inherited from their parents and in managerial abilities. Managerial ability is composed of innate intelligence and parental background. An individual's parental background refers to his parent's occupation of either having been an entrepreneur or having been a worker. According to their managerial ability individuals chose to become entrepreneurs or workers. Entrepreneurs produce a homogeneous good by using labor, capital, and their ability as inputs. Individuals live for one period, during which they receive their parents' bequests, make optimal occupational choices, lend or borrow capital, work, consume, and pass on bequests to their children. Each individual has one parent and is replaced by one child of random intelligence. Each period there is a mass L_t^0 individuals whose parents were workers, and a mass L_t^1 individuals whose parents were entrepreneurs, with $L_t^0 + L_t^1 = 1$. The government in this economy manages an unemployment insurance and collects taxes.

Preferences An individual born in period t derives utility from personal consumption, c_t , and bequests, b_t , left to his child

$$U(c_t, b_t) = c_t^\omega b_t^{1-\omega}, \quad (2.1)$$

with $0 < \omega < 1$. The parameter ω reflects the importance of personal consumption for an individual's utility relative to bequests left to children.

¹⁵A recent paper by Bajona and Locay [2009] considers the period before transition and establishes a similar link between a reduced stock of managerial knowledge and low growth rates for planned economies.

Endowments Each individual has one unit of productive time that he supplies inelastically. In addition he is endowed with the bequest from his parent, denoted by x_t . Individuals also differ in their managerial abilities (z_t).

Managerial Ability Managerial ability is composed of innate intelligence (q) and parental background (p). Innate intelligence is independent and identically distributed across time and individuals in $Q = (0, \bar{q}]$, with cdf $F(q)$ and density $f(q)$. Parental background is a variable that is equal to one if one's parent was an entrepreneur and zero otherwise, $p \in \{0, 1\}$. Managerial ability is defined as the product of innate intelligence, (q) and parental background, (p)

$$z_t^p = q(1 + \phi_t p),$$

where $\phi_t \geq 0$ reflects the value that being an entrepreneur's child has for an individual's managerial ability in period t . The basic idea is that an entrepreneur passes on information to his child about how to run a business. This private information enhances an individual's managerial ability.

Production Every entrepreneur has access to the same technology. He employs workers of efficiency units (n_t) and rents capital (k_t) to produce a single output (y_t) used for consumption and bequests

$$y_t = F(z_t^p, n_t, k_t) = A_t (z_t^p)^{1-\gamma+\kappa} (k_t^\nu n_t^{1-\nu})^\gamma, \quad (2.2)$$

where $\gamma \in (0, 1)$ is the span-of-control parameter and $\kappa > 0$ determines the curvature of the entrepreneur's profit function. The capital share of production is given by $\nu\gamma \in (0, 1)$. Capital depreciates at rate δ and A_t is total factor productivity (TFP) which grows at rate g_t .

Value of Parental Background Following Hassler and Rodríguez Mora [2000], ϕ_{t+1} is defined as a decreasing function of the growth rate of total factor productivity

$$\phi_{t+1} = a(g_t), \quad (2.3)$$

with $a(g_t) \geq 0$ and $\frac{\partial a(g_t)}{\partial g_t} < 0$.¹⁶ Fast technological change implies that today resembles yesterday less and that the value of private information inherited from parents is being

¹⁶Instead, ϕ_t could be defined as a decreasing function of output growth. Given that the steady-state growth rate of TFP is equal to $(1 - \nu\gamma)$ times the growth rate of output, results will most likely be similar.

reduced. When TFP growth is high, past information about how to run a business becomes completely worthless and everyone's managerial talent is solely defined by their intelligence

$$\lim_{g_t \rightarrow 1} a(g_t) = 0.$$

Entrepreneurs Entrepreneurs choose optimal amounts of labor and capital in order to maximize their profits net of income taxes (τ). For any efficiency unit of labor hired entrepreneurs contribute $\tau_t^u w_t$ to the unemployment insurance. Given a wage rate (w_t) and a rental rate for capital (R_t), the entrepreneurs' problem is

$$\max_{\{n_t, k_t\}} \Pi_t = (1 - \tau)[A_t(z_t^p)^{1-\gamma+\kappa}(k_t^\nu n_t^{1-\nu})^\gamma - (1 + \tau_t^u)w_t n_t - R_t k_t]. \quad (2.4)$$

Combining the two first order conditions of this maximization problem, the optimal capital-labor ratio for entrepreneurs is given by

$$\frac{k_t}{n_t} = \frac{\nu}{1 - \nu} \frac{(1 + \tau_t^u)w_t}{R_t}, \quad (2.5)$$

which is increasing in the contribution to the unemployment insurance (τ_t^u). The entrepreneur's profits are

$$\pi_t(z_t^p; \cdot) = (1 - \tau)(1 - \gamma)A_t^{\frac{1}{1-\gamma}}(z_t^p)^{\frac{1-\gamma+\kappa}{1-\gamma}} \left(\frac{\gamma(1 - \nu)}{(1 + \tau_t^u)w_t} \right)^{\frac{\gamma}{1-\gamma}} \left(\frac{\nu}{1 - \nu} \frac{(1 + \tau_t^u)w_t}{R_t} \right)^{\frac{\nu\gamma}{1-\gamma}}. \quad (2.6)$$

Higher wages (w_t), higher income taxes (τ), higher contributions to the unemployment insurance (τ_t^u), as well as higher interest rates (R_t), and a larger span-of-control parameter (γ) all reduce entrepreneur's profits. A higher level of managerial talent (z_t^p) on the other hand, increases profits of the entrepreneur. Since $\frac{\partial z_t^p}{\partial \phi_t} \geq 0$, profits are also increasing in the value of entrepreneurial parental background. Given the negative relation between the growth rate of TFP and the value of an entrepreneurial parental background (see Equation 2.3), low technological growth today implies higher profits for children of entrepreneurs in the future.

Workers Workers supply their efficiency units of labor inelastically. Their intelligence (q) is transformed linearly into efficiency units of labor so that their wage as workers is given by

$$(1 - \tau_t^u - \tau)w_t q. \quad (2.7)$$

Workers also pay income taxes (τ). Mimicking the German unemployment insurance, both employers and workers contribute the same fraction τ_t^u of workers' gross wages to the insurance scheme.

Unemployed Unemployed individuals receive a fraction ς of the wage rate per efficiency unit as unemployment benefits (v_t)

$$v_t = \varsigma w_t,$$

which are paid independently of an individual's intelligence.

2.1 Decisions

Individuals can choose to set up their own business, to become workers, or to be unemployed. Given perfect foresight, they compare among potential incomes from the three occupations and choose the one that maximizes their income.¹⁷ Individuals also decide about consumption and bequests left to their children.

Becoming an Entrepreneur Individuals compare their potential wage (Equation 2.7), to the profits they could make as entrepreneurs (Equation 2.6). Whenever, $\pi_t(z_t^p; \cdot) \geq (1 - \tau_t^u - \tau)w_tq$, they set up their own business. The cut-off value of managerial ability (\hat{z}_t^p) describing the individual who is indifferent between working or setting up a business is given by

$$\hat{z}_t^p = \left((1 + \phi_t p)^{-1} w_t^{\frac{1-\nu\gamma}{1-\gamma}} R_t^{\frac{\nu\gamma}{1-\gamma}} \Psi_t^{-1} (1 - \tau)^{-1} (1 + \tau_t^u)^{\frac{\gamma-\nu\gamma}{1-\gamma}} (1 - \tau_t^u - \tau) \right)^{\frac{1-\gamma}{\kappa}}, \quad (2.8)$$

where $\Psi_t = A_t^{\frac{1}{1-\gamma}} (1-\gamma)(\gamma(1-\nu))^{\frac{\gamma}{(1-\gamma)}} \left(\frac{\nu}{1-\nu}\right)^{\frac{\nu\gamma}{1-\gamma}}$. The threshold of occupational choice \hat{z}_t^p , is decreasing in the value of entrepreneurial parental background. Individuals whose parents were entrepreneurs set up a business at a lower level of managerial ability than individuals whose parents were workers. When TFP grows fast, the value of entrepreneurial parental background vanishes ($\phi_t \rightarrow 0$) and the two thresholds for marginal entrepreneurs from different family backgrounds coincide. Higher wages make being a worker more attractive relative to being an entrepreneur. As long as the capital share is restricted to be smaller than unity ($\nu\gamma < 1$) higher wages increase the threshold of occupational choice, leading to fewer entrepreneurs. A higher rental rate for capital reduces entrepreneurial profits and also increases the threshold. Income taxes (τ) and the contribution to the unemployment insurance (τ_t^u) have ambiguous effects on the occupational choice of individuals, because they reduce both, wages of workers and profits of entrepreneurs. However, profits of entrepreneurs are affected less by higher contributions to the unemployment insurance because as part of labor costs these are deductible from profit taxes. As long as the

¹⁷Note that parents' decisions do not take into account that becoming an entrepreneur generates a value of parental background and thus a possibly higher managerial ability for their children.

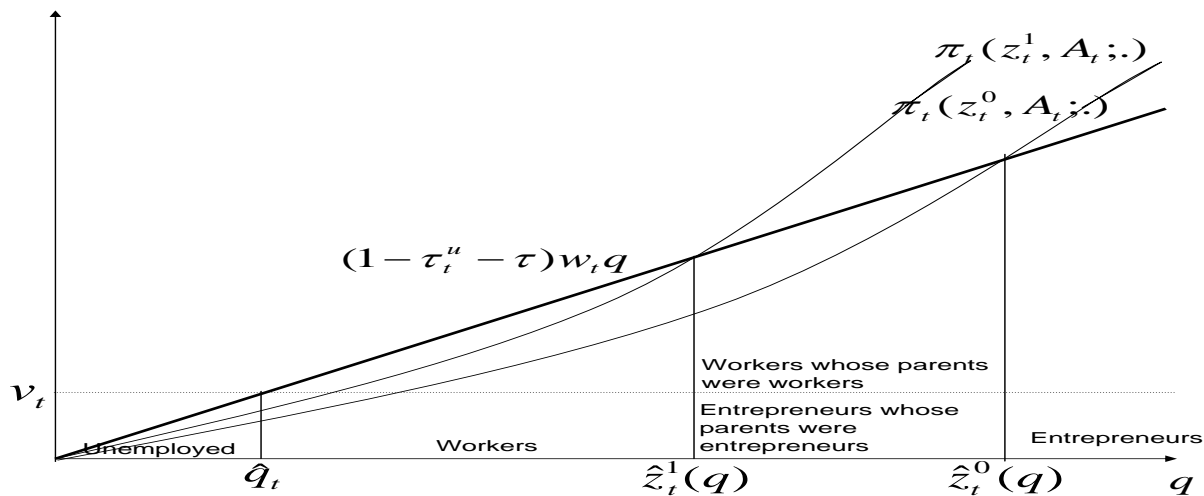
span-of-control parameter (γ) is restricted to values smaller than 0.5 and capital has a strictly positive share in production ($\nu > 0$), higher contributions to the unemployment insurance reduce the threshold of occupational choice, leading to more entrepreneurs. Higher income taxes also lead to more entrepreneurs as their negative effect on workers' net wages is amplified by the contribution to the unemployment insurance.¹⁸

Becoming a Worker Individuals then compare unemployment benefits (v_t) to their potential wage (Equation 2.7). The marginal worker, the individual with intelligence \hat{q}_t is indifferent between working or being unemployed

$$\hat{q}_t = \frac{s}{(1 - \tau_t^u - \tau)}. \quad (2.9)$$

This threshold is independent of both the wage rate and an individual's parental background. Figure 2.4 displays the thresholds of occupational choice for individuals from an entrepreneurial family background and for those from a working family background.

Figure 2.4: Thresholds of Occupational Choice



The Individual's Problem An individual born in period t receives his bequest (x_t) and chooses an optimal occupation that determines how he will employ his labor endowment

¹⁸For the case of $\tau_t^u = 0$, higher income taxes do not affect the threshold because their impact on workers' wages is completely offset by their effect on entrepreneurs' profits.

and his bequest. The individual then is unemployed, works, or runs a business. Finally he consumes and leaves a bequest to his child. Formally the individual's problem is

$$\max_{c_t \geq 0, b_t \geq 0} c_t^\omega b_t^{1-\omega}$$

subject to

$$c_t + b_t = x_t(1 + R_t - \delta) + \max\{v_t, (1 - \tau_t^u - \tau)w_tq, \pi_t(z_t^p; \cdot)\}.$$

Individuals can lend their bequests to firms at the competitive rental rate R_t . The first order conditions of the individual's problem give rise to the following two optimal decisions:

$$c_t(z_t^p; \cdot) = \omega[x_t(1 + R_t - \delta) + \max\{v_t, (1 - \tau_t^u - \tau)w_tq, \pi_t(z_t^p; \cdot)\}],$$

and

$$b_t(z_t^p; \cdot) = (1 - \omega)[x_t(1 + R_t - \delta) + \max\{v_t, (1 - \tau_t^u - \tau)w_tq, \pi_t(z_t^p; \cdot)\}].$$

The individual spends a fraction ω of his income on consumption and leaves the rest as a bequest to his child. In addition to these two optimal decisions the solution to the individual's problem includes his optimal occupational choice.

2.2 Aggregate Economy

Aggregate Capital Supply Each period the economy's aggregate capital stock (X_t) is determined by the sum of all bequests from last period

$$X_t = L_{t-1}^0 \int_0^{\bar{z}^0} b_{t-1}(z_{t-1}^0; \cdot) f(q) dq + L_{t-1}^1 \int_0^{\bar{z}_{t-1}^1} b_{t-1}(z_{t-1}^1; \cdot) f(q) dq, \quad (2.10)$$

where b_{t-1} represent bequest decisions taken last period. Last period's individuals were either children of workers L_{t-1}^0 or children of entrepreneurs L_{t-1}^1 .¹⁹

Growth Rate The growth rate of TFP is defined as a one-period percentage change in the level of TFP

$$g_t = \frac{A_t - A_{t-1}}{A_{t-1}}.$$

¹⁹Given perfect capital markets and the warm glow motive for bequests in agents' utility, there is no need to follow the joint distribution of wealth and entrepreneurial ability in this economy.

Following Hassler and Rodríguez Mora [2000], the growth rate of TFP is a positive function of the intelligence of last period's entrepreneurs (\bar{Q}_{t-1}),

$$g_t = h(\bar{Q}_{t-1}),$$

where

$$\bar{Q}_{t-1} = L_{t-1}^0 \int_{\hat{z}_{t-1}^0}^{\bar{z}^0} qf(q) dq + L_{t-1}^1 \int_{\hat{z}_{t-1}^1}^{\bar{z}_{t-1}^1} qf(q) dq$$

and h being some increasing function of \bar{Q}_{t-1} .²⁰ The intelligence of last period's entrepreneurs is the sum of intelligence of entrepreneurs who are children of workers L_{t-1}^0 and those who are children of entrepreneurs L_{t-1}^1 . Given these two groups of individuals \bar{Q}_{t-1} is maximized by assigning occupations such that the span of intelligence is the same for both groups, i.e. the least intelligent and the most intelligent entrepreneur from both parental backgrounds have to coincide. However, in case the value of parental background is high there will be more entrepreneurs with an entrepreneurial family background. Hence, aggregate intelligence of entrepreneurs will be lower and the individual's occupational choice thus exerts a negative externality on the economy's growth rate.

Government The government collects income taxes from entrepreneurs and workers and uses them for pure government consumption. Contributions to the unemployment insurance scheme from both workers and entrepreneurs have to be such as to fully finance benefits paid to the unemployed in each period. Each period the government has to fulfill the following two constraints

$$\begin{aligned} G_t = & \tau \left\{ L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^1} (y_t - w_t(1 + \tau_t^u)n_t - R_t k_t) f(q) dq + L_t^0 \int_{\hat{z}_t^0}^{\bar{z}_t^0} (y_t - w_t(1 + \tau_t^u)n_t - R_t k_t) f(q) dq + \right. \\ & \left. + L_t^1 \int_{\hat{q}_t}^{\hat{z}_t^1} w_t q f(q) dq + L_t^0 \int_{\hat{q}_t}^{\hat{z}_t^0} w_t q f(q) dq \right\}, \end{aligned} \quad (2.11)$$

and

$$v_t \int_0^{\hat{q}_t} f(q) dq = 2\tau_t^u w_t \left(L_t^0 \int_{\hat{q}_t}^{\hat{z}_t^0} q f(q) dq + L_t^1 \int_{\hat{q}_t}^{\hat{z}_t^1} q f(q) dq \right). \quad (2.12)$$

²⁰Hassler and Rodríguez Mora [2000] reason the positive relationship between entrepreneurs' intelligence and TFP growth as follows: 'the higher the individual entrepreneur's ability to learn or understand or to deal with new or trying situations, the larger will the individual's technological innovations be. This will create a feedback mechanism whereby rapid technology growth creates an environment in which the sorting of individuals to entrepreneurial positions is based on intelligence, not on social background.' (pg.889).

When paying income taxes, entrepreneurs can deduct contributions to unemployment insurance for their employees. The sum of all contributions can be defined as twice the contributions made by employees given that employers and employees each contribute equal parts to the insurance scheme.

Equilibrium In equilibrium all three markets for goods, capital, and labor must clear. Labor supply is given by the productive time of those individuals who are neither entrepreneurs nor opt for unemployment. Denote by $n_t(z_t^p; \cdot)$ and $k_t(z_t^p; \cdot)$ optimal demands for labor and capital services by an entrepreneur born in period t who has managerial ability z_t^p . Then for the labor market to clear we require aggregate labor demand

$$N_t^d = L_t^0 \int_{\hat{z}_t^0}^{\bar{z}^0} n_t(z_t^0; \cdot) f(q) dq + L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^1} n_t(z_t^1; \cdot) f(q) dq, \quad (2.13)$$

to be equal to aggregate labor supply $N_t^s = L_t^0 \int_{\hat{q}_t}^{\bar{z}_t^0} q f(q) dq + L_t^1 \int_{\hat{q}_t}^{\bar{z}_t^1} q f(q) dq$.

For the capital market to clear we require aggregate capital demand to equal aggregate capital supply

$$K_t^d = L_t^0 \int_{\hat{z}_t^0}^{\bar{z}^0} k_t(z_t^0; \cdot) f(q) dq + L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^1} k_t(z_t^1; \cdot) f(q) dq = X_t. \quad (2.14)$$

With $y_t(z_t^p; \cdot)$ being the supply of goods by any entrepreneur of ability z_t^p , for market clearing in the goods market we require

$$\begin{aligned} & L_t^0 \int_{\hat{z}_t^0}^{\bar{z}^0} y_t(z_t^0; \cdot) f(q) dq + L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^1} y_t(z_t^1; \cdot) f(q) dq = \\ & = L_t^0 \int_0^{\bar{z}^0} (c_t(z_t^0; \cdot) + b_t(z_t^0; \cdot)) f(q) dq + L_t^1 \int_0^{\bar{z}_t^1} (c_t(z_t^1; \cdot) + b_t(z_t^1; \cdot)) f(q) dq - \\ & \qquad \qquad \qquad - X_t(1 - \delta) + G_t. \end{aligned} \quad (2.15)$$

Aggregate consumption, bequests, and government consumption have to equal the sum of aggregate production and the depreciated capital stock.

The law of motion for the mass of entrepreneurs is given by the following equation

$$L_t^1 = L_{t-1}^0 \int_{\hat{z}_{t-1}^0}^{\bar{z}^0} f(q) dq + L_{t-1}^1 \int_{\hat{z}_{t-1}^1}^{\bar{z}_{t-1}^1} f(q) dq. \quad (2.16)$$

We can now define a competitive equilibrium for the model economy. Given an initial capital stock, X_0 , an initial fraction of entrepreneurs L_0^1 , and their intelligence, \bar{Q}_{-1} , a government policy, $\{\tau, \varsigma\}$, and a sequence of prices for labor and capital $\{w_t, R_t\}_0^\infty$, a competitive equilibrium is a collection of sequences $\{c_t(z_t^p; \cdot), b_t(z_t^p; \cdot), \hat{z}_t^p, \hat{q}_t, \tau_t^u, G_t\}_0^\infty$ for $p \in \{0, 1\}$ such that:

1. $\{c_t(z_t^p; \cdot), b_t(z_t^p; \cdot), \hat{z}_t^p, \hat{q}_t\}_0^\infty$ solves the individual's problem for each $p \in \{0, 1\}$ and for each t ;
2. all three markets, for goods, capital, and labor clear, i.e. equations (2.13)-(2.15) hold for all t ;
3. $\{\tau_t^u\}_0^\infty$ is such that the unemployment insurance is self-financing, equation 2.12 holds for all t ;
4. $\{G_t\}_0^\infty$ is such that equation 2.11 holds for all t .

2.3 Calibration

I first calibrate the basic model economy to West Germany before reunification fixing parameter values for preferences and technology and pinning down key parameters governing the role of parental background and the link between entrepreneurship and growth. The so-determined parameter values are then used for the extended version of the model economy that accounts for aspects of reunification allowing for migration between West and East Germany. While some parameters of the model are assigned values based on a-priori information others are calibrated to match certain statistics of the West German economy before reunification. Given that one period in this economy is equivalent to one generation, 20 years, calibration targets are average data for 1970-1989. I then specify the function $h(\bar{Q}_{t-1})$ that relates intelligence of entrepreneurs and TFP growth and the function $a(g_t)$, relating TFP growth and the value of parental background in entrepreneurship.

Fixing Parameter Values For the mean log-managerial ability (μ) and its dispersion (σ), I use values of 2.11 and 0.58 respectively as estimated by Chang [2000] using the US wage distribution for non-supervisory workers. A more regulated German labor market and lower labor-market participation by low-skilled individuals make the use of a West German wage distribution less adequate for estimating a distribution of abilities. Factors

other than underlying ability lead to higher mean and lower variation in wages.²¹ The US wage distribution, since it is less contaminated by policies, seems to be a better reflection of individuals' abilities. The span-of-control parameter (γ) is set to 0.865. Using 3-digit industry data, Burnside et al [1995] estimate returns to scale in production to lie between 0.81 and 0.92. I choose the midpoint of their values. For the annual depreciation rate δ I chose a value of 0.1 as in Prescott [1986].

The remaining five parameters are chosen to match the first five calibration targets of Table 2.1. The importance of capital (ν) is calibrated to a value of 0.3468 in order to target a capital share of 0.3 in the model. For the period 1970 to 1989, the Deutsche Bundesbank [2001] reports a labor share between 0.72 and 0.67 for West Germany, implying a capital share between 0.28 and 0.33. The parameter for the relative importance of consumption in utility (ω) is assigned a value of 0.828 to match an average annual capital-output ratio of 2.03 as estimated by Maddison [1995] for West Germany for 1950-1992. The unemployment benefit as a fraction of the wage rate per efficiency unit (ς) is calibrated to 2.7 in order to target an unemployment rate of 5.4%, as reported for West Germany for 1970 and 1989 (Bundesagentur für Arbeit [2007]). The parameter for the curvature of the profit function (κ) is assigned a value of 0.07 to match the fraction of entrepreneurs in the model with a business ownership rate of around 7%, as estimated by Entrepreneurs International (Compendia) [2002] for West Germany for 1972 to 1989.²² The parameter for the income tax rate (τ) is calibrated to a value of 0.175 to match the ratio of tax revenues to GDP in the model to taxes on income and profits as percentage of GDP of 12.2% as reported by the OECD [2006] for West Germany for the period 1975 to 1990.

Specifying Functional Forms The two center pieces of the model economy are 1) the function relating entrepreneurs' intelligence to economic growth and 2) the function relating economic growth to the value of entrepreneurial parental background for managerial ability. The model's results are essentially determined by the functional forms and parameter values assigned to these functions. Careful calibration is thus crucial for obtaining sensible results for the basic model as well as for the extended version of the model economy.

²¹Gernandt and Pfeiffer [2007] estimate a wage distribution for West Germany for gross hourly wages for prime age dependent male workers for 1984-1989, with mean 2.42 and standard deviation 0.118.

²²In this data set business owners include self-employed and owners/managers of incorporated businesses whose income includes profits as well as a salary. Unpaid family workers are excluded. The business ownership rate is constructed by dividing the number of business owners by the total labor force. Data is available from 1972 onwards. For the US, Chang [2000] estimates a value of 0.075 for the parameter describing the curvature of the profit function.

Table 2.1: Calibration Targets

	Target	Model
Capital Share (1970-1989)	0.3	0.3
Capital-Output Ratio (1970-1989)	2.03	2.03
Unemployment Rate (1970-1989)	5.4%	5.7%
Business Ownership Rate (1972-1989)	6.9%	7.9%
Tax Revenues to GDP (1975-1990)	12.2%	12.2%
Average Annual Growth Rate of GDP (1971-1989)	2.1%	2.1%
Percentage of Entrepreneur with Entrepreneurial Parent (1970-1980)	63.5%	63.5%

I specify the function $h(\bar{Q}_{t-1})$ relating intelligence of entrepreneurs to the growth rate of TFP as follows:

$$g_t = h(\bar{Q}_{t-1}) = \frac{1}{(1 + e^{-\bar{Q}_{t-1}})^{1/\alpha}}.$$

To obtain a positive relationship between intelligence of entrepreneurs and technological growth, $\alpha \geq 0$ has to hold. I choose α equal to 0.1795 to match that between 1971 and 1989 West German GDP per capita grew at an average annual rate of 2.1% (Heston et al. [2009]).²³ Finally, I specify the function $a(g_t)$ that relates TFP growth to the value of entrepreneurial parental background

$$\phi_{t+1} = a(g_t) = \frac{\bar{\phi}}{1 + g_t},$$

where $\bar{\phi}$ is a parameter. This parameter is assigned a value of 0.73 to match the inter-generational persistence of occupations. According to Müller and Pollak [2004] between 1976 and 1999 around 63.5% of large employers, and higher and lower grade professionals with higher technical, administrative and managerial occupations in Germany remained within their class. I set the calibration target for the percentage of entrepreneurs whose parents were entrepreneurs to 63.5%. Table 2.2 reports all parameter values. This last calibration target is controversial and the calibrated parameter $\bar{\phi}$ has an important effect on the model's results. Hence further discussion is needed.

Value of Parental Background-Discussion How many entrepreneurs come from an entrepreneurial family background? Looking at West German data for 1970 and 1980, Arum and Müller [2004] find that 14.7% of all self-employed had a self-employed father.

²³Data is provided from 1971 onwards.

Table 2.2: Parameters

Mean Log-Managerial Ability (μ)	2.11
Dispersion in Log-Managerial Ability (σ)	0.58
Span-of-Control (γ)	0.865
Annual Depreciation Rate (δ)	0.1
Importance of Capital (ν)	0.3468
Relative Importance of Consumption in Utility (ω)	0.828
Unemployment Benefit (ς)	2.7
Curvature of Profit Function(κ)	0.07
Income Tax (τ)	0.175
Parameter for Function Relating Entrepreneurs' Intelligence to Growth (α)	0.1795
Parameter for Function Relating Growth to Value of Parental Background ($\bar{\phi}$)	0.73

Lohmann and Luber [2004] report that between 1984 and 1988, 36% of West German males with a self-employment family background became self-employed. On the other end of the scale, Klein [2000] finds that only 39% of all German family firms are in their founder generations, rising the likelihood of being an entrepreneur if one's parents were so to 61%.²⁴ According to Mueller [2006] German employees whose parents have been self-employed are about 1.5 times as likely to start a business as others.²⁵ Geißler [2006] differentiates between social mobility of entrepreneurs with more than 10 employees and those operating on a smaller scale. He estimates that 50% of the former and 19% of the latter had parents who were also entrepreneurs. Given the broad span of estimates for the persistence of entrepreneurship across generations, I consider alternative interpretations of occupational inheritance. Within the framework of the model the most wealthy individuals, who consume more and leave more bequests to their children, will always be entrepreneurs. Hence, one can clearly distinguish three different economic 'classes' in the model: the unemployed, the working class, and the entrepreneurial class. The question of 'how many entrepreneurs come from an entrepreneurial family background?' can thus be turned into a question of 1)class mobility and/or 2)wealth persistence and/or 3)earnings mobility.

West Germany is generally found to be a society of relatively little class mobility. Erik-

²⁴ Only 1 of the 59 German companies listed in the Forbes List 2000 was founded after 1990. The other 15 companies with founding date after 1990 are privatization, mergers, or spinoffs of older companies.

²⁵For the US Lentz and Laband [1990] find that 50% of all self-employed proprietors are 2nd generation proprietors.

son and Goldthorpe [1993] conclude that in West Germany “quite contrary to a [...] ‘semi-classless’ form of society and a ‘land of fluidity’ [...] historically formed influences on class-mobility chances have largely retained their power” (p.151) Müller and Pollak [2004] consider class mobility in West Germany and find that for the periods 1976-80, 1982-90, and 1991-99, 64%, 63%, and 63% of large employers, and higher and lower grade professionals with higher technical, administrative and managerial occupations remained within their class. Furthermore, the authors conclude that “we cannot find any major changes in (absolute) mobility experiences in the last quarter of the twentieth century.” (pg.91) “Germany continues to have strong inheritance effects [...] as well as particularly marked distinctions between a manual and non-manual space of social mobility.” (pg.110) “In sum [...] in Germany a large part of the effects of origin class on class destination is mediated through education. In particular the hierarchical component in class-mobility results from class inequalities in educational participation and education-based class allocation.” (pg.106) This observation combined with recent data by the OECD [2007b] showing that “students from a blue-collar background are about one-half as likely to be in higher education as compared with what their proportion in the population would suggest.” (pg.116) indicate little class mobility in West Germany.²⁶

Estimates of wealth persistence by Morck et al. [1998] also sketch a picture of rather limited intergenerational mobility in West Germany, while Solon [2002] cites estimates of intergenerational earnings elasticity that describe Germany as a country of relatively high earnings mobility. However, as Goldberger [1989] points out: “Naturally enough the sociologists’ models incorporate outcomes other than income or earnings. Now suppose that intergenerational links are stronger for occupation or socioeconomic status than for income or earnings. Then restricting attention to the monetary measures could lead an economist to understate the influence of family background on inequality.” (pg.513). Estimates on class mobility provide the most widely encompassing concept of the dependence of one’s status on family background. In the model class mobility and occupational mobility coincide and thus I use Müller and Pollak [2004]’s estimates for calibration.

2.4 Results

I simulate the model economy until convergence to a balanced growth path. The model hits most of its calibration targets of Table 2.1 well. However, the fraction of entrepreneurs

²⁶Comparing social mobility among European countries, Breen and Luijckx [2004] conclude that “Germany, France, Italy, and Ireland seem to be the least fluent countries [...] [in]-notably Germany- there is no statistically significant change[...] towards a weaker association between origins and destinations.” (pg 73).

is slightly higher in the model than in the data.²⁷ Table 2.3 presents additional steady state results. On average, entrepreneurs are twice as intelligent as the average individual, and entrepreneurs from a working family background are 2.4 times as intelligent as entrepreneurs from an entrepreneurial family background. Having had a parent who was an entrepreneur increases one’s managerial ability by around 55%, ($\phi = 0.547$). Only 3.2% of entrepreneurs come from a working family background compared to 63.5% whose parents were entrepreneurs.

Table 2.3: Additional Steady State Average Results: Annual Values

Entrepreneurship	
Working Background Individuals Becoming Entrepreneurs	3.2%
Relative Average Intelligence of Entrepreneurs	1.97
Av. intell. of Entrepreneurs from Working vs. Entrepreneurial Background	2.43
Value of Entrepreneurial Parental Background	0.547
West Germany before Reunification	
Growth Rate of TFP	1.5%
Average Firm Size (Workers)	10.9
Contribution to Unemployment Insurance	1%
Unemployment Benefit as Fraction of Mean Nominal Wage	28.9%

TFP grows at an annual rate of 1.5%. In steady state TFP growth is equal to $(1 - \nu\gamma)$ times the annual growth rate of GDP. The model is able to generate an average firm size of 10.9 workers per firm which is consistent with data. Entrepreneurs International (Compendia) [2002] report that between 1972 and 1989 the average West German firm had approximately 11 employees.²⁸ The ratio of unemployment benefits to mean nominal wage in the model is 28.8%. This value is very similar to more recent data. In 1991, the ratio of monthly social subsidies to the monthly nominal average equivalent income in West Germany was 0.29 (Bundesministerium für Arbeit und Soziales [2008] and DIW [1995]). Contributions to unemployment insurance with employers and employees each paying 1% of gross wages result somewhat lower in the model than in the data. According to Glismann and Schrader [2002] contributions to unemployment insurance in West Germany between 1970 and 1989 were equal to 2.9% of gross income, employers and employees each

²⁷One could improve upon this by assuming that there is a number of very talented entrepreneurs that manage large firms given that the largest firms in the data are not captured by a simple log-normal distribution of intelligence (see Guner et al [2008]).

²⁸This result arises naturally when targeting both, the fraction of entrepreneurs and the unemployment rate in calibration.

paying 1.45%.

3 Extended Model

Having presented the basic framework I am now ready to extend the model economy to account for aspects of reunification in order to be able to address the two main questions of this paper: Did East Germany's integration into an established economy - West Germany - hinder a fruitful development of entrepreneurship? And did the resulting lack of entrepreneurship affect economic growth in East Germany?

The German reunification implied the economic integration of one smaller region into a larger one. Economic integration is modeled in this paper as the two regions having common goods and capital markets, but locally separated labor markets. East Germany is integrated into West Germany and adopts all its policies. The government fixes wages in East Germany to a fraction $(1 - \lambda_t)$ of West German wages and governmental investment aids lower the rental rate for capital in East Germany to $R_t^* = (1 - \chi_t)R_t$. Initially, TFP in East Germany is lower than in West Germany ($A_t^* < A_t$) and the economy's aggregate capital stock is given by the sum of the two capital stocks. In contrast to West Germans, all East Germans of the first generation after reunification are children of workers.²⁹ By paying a fixed moving cost individuals can opt for working or setting up a business in the other part of Germany. In each region there is a fraction of θ individuals who are mobile and a fraction of $(1 - \theta)$ individuals who are immobile. Immobile individuals face infinitely high moving costs $\eta_t^h = \infty$ and more mobile individuals face lower moving costs (η_t^l). The distribution of innate intelligence $f(q)$, is identical for East and West Germans.

3.1 West Germans

Upon reunification West Germans can migrate to East Germany and set up a business there, taking advantage of the lower labor cost and a lower rental rate of capital. However, TFP in East Germany is lower and moving requires the payment of a fixed cost. No West German migrates to East Germany to work there as wages in East Germany are lower. Given a fixed cost for moving from West to East Germany (η_t^j) with $j \in \{h, l\}$, a wage rate for East Germany $(1 - \lambda_t)w_t$, and a reduced rental rate for capital $(1 - \chi_t)R_t$, the

²⁹Depending on occupational choices made in the first generation East Germans of successive generations will be children of workers and entrepreneurs.

problem of a West German who sets up his business in East Germany is

$$\max_{\{n_t, k_t\}} \Pi_t = (1 - \tau)[A_t^*(z_t^p)^{1-\gamma+\kappa}(k_t^\nu n_t^{1-\nu})^\gamma - (1 - \lambda_t)(1 + \tau_t^u)w_t n_t - (1 - \chi_t)R_t k_t - \eta_t^j]. \quad (3.17)$$

Smaller discounts on wages (λ_t) and on the rental rate of capital (χ_t) as well as higher moving costs (η_t^j), reduce profits of West Germans who set up their businesses in East Germany.³⁰ Their optimal profits are denoted by $\pi_t(z_t^p, A_t^*, \eta_t^j; \cdot)$. Individuals in West Germany compare their potential profits from setting up a business in East Germany to the potential incomes resulting from the previously discussed occupations. They compare profits from setting up a business in East Germany (Equation 3.17) to profits they can make as entrepreneurs in West Germany (Equation 2.6). The cut-off value of managerial ability $\tilde{z}_t^{p,j}$, describes the individual who is indifferent between setting up his business in West or East Germany

$$\tilde{z}_t^{p,j} = \left(\eta_t^j (w_t (1 + \tau_t^u))^{\frac{(1-\nu)\gamma}{1-\gamma}} R_t^{\frac{\nu\gamma}{1-\gamma}} \Psi_t^{-1} \left(\frac{A_t^*}{A_t (1 - \lambda_t)^{\frac{(1-\nu)\gamma}{1-\gamma}} (1 - \chi_t)^{\frac{\nu\gamma}{1-\gamma}}} - 1 \right)^{-1} \right)^{\frac{1-\gamma}{1-\gamma+\kappa}}. \quad (3.18)$$

This threshold of occupational choice is independent of an individual's parental background, $\tilde{z}_t^{p,j} = \tilde{z}_t^j$. Higher moving cost (η_t^j), a lower discount on wages (λ_t), and a lower discount on the rental rate of capital (χ_t), all reduce entrepreneurial income in East Germany and thus raise the threshold.

As managerial ability is defined in the interval $z_t^p \in (0, \bar{z}_t^p]$ this threshold needs to be strictly positive, i.e:

$$\frac{A_t^*}{A_t (1 - \lambda_t)^{\frac{(1-\nu)\gamma}{1-\gamma}} (1 - \chi_t)^{\frac{\nu\gamma}{1-\gamma}}} - 1 > 0.$$

This is the case only if

$$(1 - \lambda_t)^{(1-\nu)\gamma} (1 - \chi_t)^{\nu\gamma} < \frac{A_t^{*1-\gamma}}{A_t}.$$

Only if the discount on wages and the discount on the rental rate of capital are large enough to offset the reduced TFP in East Germany do West German individuals whose managerial ability lies above the threshold (\tilde{z}_t^j) prefer to set up a business in East Germany over setting it up in West Germany. If discounts are too small, or differences in TFP are large, no West German individual opts for setting up his business in East Germany.

³⁰Moving costs are assumed to be deductible from profit taxes.

In this case as well as if moving costs are very large or if there are no mobile individuals, thresholds of occupational choices of West Germans after reunification remain unaltered and are as displayed in Figure 2.4.³¹

3.2 East Germans

For East Germans, reunification implies free occupational choices. They can decide to set up their own business, to become a worker, to be unemployed, or they can migrate to West Germany to work or to set up a business there.³²

East German Workers Initially East Germans do not have any notion of unemployment.³³ But given full knowledge of the wage setting policy East Germans instantaneously adapt their expectations.³⁴ With a certain probability ψ_t , they rationally expect to be involuntarily unemployed when choosing to work in East Germany.³⁵ East German workers earn a fraction $(1 - \lambda_t)$ of West German wages, thus, their expected income in East Germany is given by

$$(1 - \psi_t)(1 - \tau_t^u - \tau)(1 - \lambda_t)w_tq + \psi_t\varsigma w_t. \quad (3.19)$$

East Germans who migrate to West Germany to work there earn the same wage as West Germans, less a moving cost $\eta_t^{*,j}$

$$(1 - \tau_t^u - \tau)w_tq - \eta_t^{*,j}. \quad (3.20)$$

East German Entrepreneurs East German entrepreneurs face the following profit maximization problem

$$\max_{\{n_t, k_t\}} \Pi_t = (1 - \tau)[A_t^*(z_t^p)^{1-\gamma+\kappa}(k_t^\nu n_t^{1-\nu})^\gamma - (1 - \lambda_t)(1 + \tau_t^u)w_tn_t - (1 - \chi_t)R_tk_t]. \quad (3.21)$$

³¹See Appendix A.1 for additional comparisons West Germans make to choose their optimal occupation.

³²East German unemployed receive the same benefits as West German unemployed, hence for them the option to migrate to West Germany is never better than staying in East Germany, given that migration is costly

³³Many authors have described the fact that under the communist regimes, the “threat of unemployment was therefore virtually nil[...]” (Roland [2000], pg.9). Pohl [1996] describes East Germany as “a society in which unemployment was never experienced as a direct threat to the individual”, (pg.64)

³⁴Assuming that it takes one generation to adapt expectations hardly alters results.

³⁵Note that given this uncertainty, the individual problem for the East German thus corresponds to maximizing his expected utility, $E_t[U(c_t, b_t)]$.

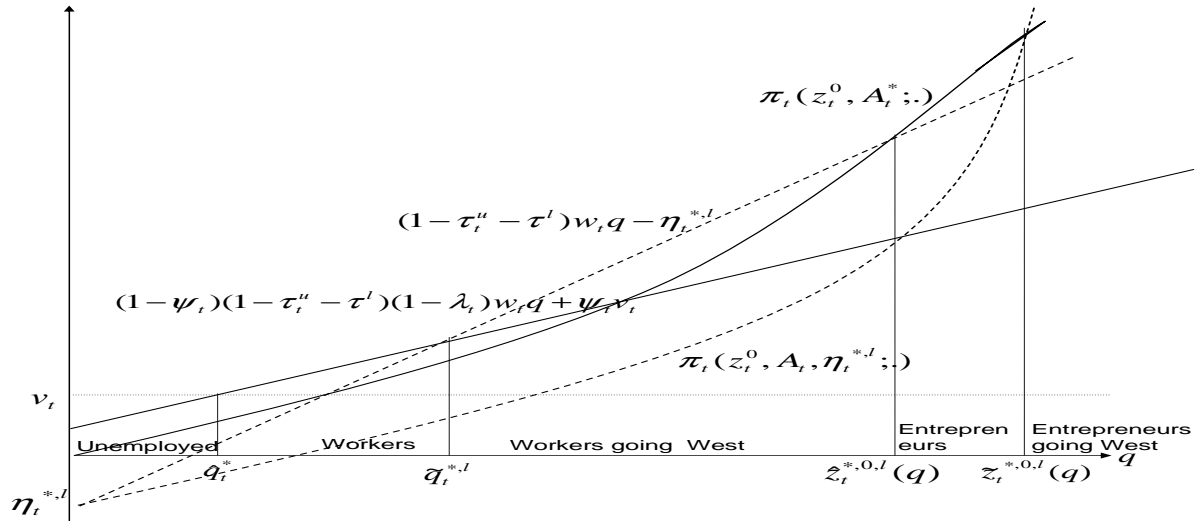
Greater gaps between East and West German wages (λ_t), and East and West German rental rates of capital (χ_t) increase profits of East German entrepreneurs. Denote their optimal profits by $\pi_t(z_t^p, A_t^*; \cdot)$. East Germans who set up a business in West Germany face the following profit maximization problem

$$\max_{\{n_t, k_t\}} \Pi_t = (1 - \tau)[A_t(z_t^p)^{1-\gamma+\kappa}(k_t^\nu n_t^{1-\nu})^\gamma - (1 + \tau_t^u)w_t n_t - R_t k_t - \eta_t^{*,j}]. \quad (3.22)$$

Higher moving costs ($\eta_t^{*,j}$) reduce profits of East Germans who set up a business in West Germany. Higher West German TFP (A_t) on the other hand, increases their profits. Denote their optimal profits by $\pi_t(z_t^p, A_t, \eta_t^{*,j}; \cdot)$.

Occupational Choices East Germans compare potential incomes from being unemployed, working or setting up a business in East Germany, and working or setting up a business in West Germany. Figure 3.5 displays one possible realization of four thresholds of occupational choice for mobile East Germans of the first generation after reunification.³⁶ East German individuals compare their potential wage in West Germany (Equation 3.20)

Figure 3.5: Possible thresholds for occupational choice for mobile East Germans of first generation after reunification.



³⁶In order to keep the discussion tractable, here I only discuss income comparisons relevant for the case displayed in Figure 3.5. For additional comparisons East Germans make to choose their optimal occupation see Appendix A.1.

to the wage they can earn in East Germany (Equation 3.19). The cut-off value, \tilde{q}_t^j , describes the East German individual who is indifferent between working in East or West Germany

$$\tilde{q}_t^j = \frac{\psi_t \varsigma w_t + \eta_t^{*,j}}{(1 - \tau_t^u - \tau)(\psi_t + \lambda_t - \psi_t \lambda_t) w_t}. \quad (3.23)$$

Higher moving cost ($\eta_t^{*,j}$) reduce labor income in West Germany and thus the benefits from migration and raise the threshold as well as do higher wages in East Germany, a lower λ_t . A positive possibility of involuntary unemployment ψ_t , reduces the potential income of working in East Germany and thus lowers the threshold. Comparing their potential wage in West Germany to the profits they can make as entrepreneurs, East Germans set up their own business in East Germany whenever, $\pi_t(z_t^p, A_t^*; \cdot) \geq (1 - \tau_t^u - \tau)w_t q - \eta_t^{*,j}$. The cut-off value, $\tilde{z}_t^{*,p,j}$, describes the East German individual who is indifferent between working in West Germany or setting up a business in East Germany.³⁷ Furthermore, East Germans measure profits they can make as entrepreneurs in East Germany, against profits they can make setting up their business in West Germany. The cut-off value, $\tilde{z}_t^{*,p,j}$ describes the East German individual who is indifferent between setting up his business in East or West Germany

$$\tilde{z}_t^{*,p,j} = \left(\eta_t^{*,j} (w_t (1 + \tau_t^u))^{\frac{(1-\nu)\gamma}{1-\gamma}} R_t^{\frac{\nu\gamma}{1-\gamma}} \Psi_t^{-1} \left(1 - \frac{A_t^*}{A_t (1 - \lambda_t)^{\frac{(1-\nu)\gamma}{1-\gamma}} (1 - \chi_t)^{\frac{\nu\gamma}{1-\gamma}}} \right)^{-1} \right)^{\frac{1-\gamma}{1-\gamma+\kappa}}. \quad (3.24)$$

This threshold of occupational choice is independent of the individual's parental background, $\tilde{z}_t^{*,p,j} = \tilde{z}_t^{*,j}$. Higher moving cost ($\eta_t^{*,j}$) reduce entrepreneurial income in West Germany and increase the threshold. Higher wages in East Germany on the other hand, a lower λ_t , reduce entrepreneurial income in East Germany and thus lower the threshold as does a higher rental rate for capital, a lower χ_t . This threshold is positive only if

$$(1 - \lambda_t)^{(1-\nu)\gamma} (1 - \chi_t)^{\nu\gamma} > \frac{A_t^{*1-\gamma}}{A_t}.$$

Only if the discount on wages and the discount on the rental rate of capital are small enough to not offset the higher TFP in West Germany do East German individuals with

³⁷ Note that the profit function for entrepreneurs in East Germany and the function for wage income in West Germany might cross twice. Initially being an entrepreneur in East Germany is always better than working in West Germany, due to fixed moving costs. However, with increasing intelligence wage income increases and individuals are able to pay the fixed costs and thus might prefer to work in West Germany instead of setting up a business in East Germany. Given increasing returns to ability for entrepreneurs, there might exist a second threshold where setting up a business in East Germany becomes again more attractive as opposed to working in West Germany, ($\tilde{z}_t^{*,0,l}(q)$ in Figure 3.5).

managerial ability higher than the threshold value, \tilde{z}_t^{*j} , decide to set up a business in West Germany. Finally, individuals also compare the unemployment benefit v_t to their potential wage in East Germany (Equation 3.19). The cut-off value \hat{q}_t^* , describing the East German individual who is indifferent between working in East Germany or being unemployed is given by

$$\hat{q}_t^* = \frac{\varsigma}{(1 - \tau_t^u - \tau)(1 - \lambda_t)}. \quad (3.25)$$

3.3 Aggregate Economy

Lemma 3.1. *There is no equilibrium after reunification where both, West and East German individuals become entrepreneurs in both, East and West Germany.*³⁸

There will hence only exist equilibria with either East Germans setting up businesses in East and West Germany or West Germans setting up businesses in East and West Germany.

Aggregate Capital Supply Let W_t denote aggregate net wages of the economy, Π_t are aggregate after-tax profits, and UB_t are aggregate unemployment benefits. The aggregate capital stock of the reunified economy is defined by the sum of all bequests left the previous period

$$X_t = (1 - \omega)\{\Pi_{t-1} + W_{t-1} + UB_{t-1} + (1 + R_{t-1} - \delta)X_{t-1}\}, \quad (3.26)$$

where $(1 + R_{t-1} - \delta)X_{t-1}$ are last period's aggregate capital rents.

Government After reunification, the government collects income taxes in both, East and West Germany. The government also fixes the discount on East German wages (λ_t) as well as the discount on the rental rate of capital in East Germany (χ_t). Government tax revenues are used to finance the difference in the rental rate to lenders but the government cannot run a deficit.³⁹ Each period contributions to the unemployment insurance from both workers and entrepreneurs in East and West Germany have to be such as to fully finance all unemployment benefits. Let $K_t^{d,*}$ be aggregate capital demand in East Germany.⁴⁰ Each period the government has to fulfill the following two constraints

$$G_t + \chi_t R_t K_t^{d,*} = \tau(\Pi_t + W_t) - \tau\tau_t^u W_t \quad (3.27)$$

³⁸For the proof of Lemma 3.1 see Appendix A.3.

³⁹In none of the calibrated version of the model is this restriction binding.

⁴⁰ See Appendix A.2 for the explicit aggregation of the components of the two government constraints.

with $G_t \geq 0 \forall t$, and

$$UB_t = 2\tau_t^u W_t. \quad (3.28)$$

Equilibrium Given that East German wages are fixed above labor productivity, equilibria after reunification are characterized by involuntary unemployment in East Germany.⁴¹ I require that for an equilibrium there be market clearing in the common markets for goods and capital, and in at least the labor market in West Germany. I allow for the possibility of closure of the East German labor market. Denote aggregate labor demand in East and West Germany by $N_t^{d,*}$ and N_t^d respectively. $N_t^{s,*}$ and N_t^s are aggregate labor supply in East and West Germany. Aggregate capital demand in West Germany is denoted by K_t^d . Let $Y_t^{s,*}$ and Y_t^s be aggregate supply of goods in East and West Germany respectively.⁴² For the capital market to clear we require

$$X_t = K_t = K_t^{d,*} + K_t^d. \quad (3.29)$$

For the goods market to clear the following has to hold

$$\begin{aligned} Y_t^{s,*} + Y_t^s &= \omega\{\Pi_t + W_t + UB_t + (1 + R_t - \delta)X_t\} + (1 - \omega)\{\Pi_t + W_t + UB_t + \\ &\quad + (1 + R_t - \delta)X_t\} + G_t + \chi_t R_t K_t^{d,*} + \Xi_t - (1 - \delta)X_t. \end{aligned} \quad (3.30)$$

Aggregate consumption, aggregate bequests, government consumption, and aggregate moving costs (Ξ_t) have to equal the sum of production and the depreciated aggregate capital stock.⁴³ The labor market in West Germany has to clear, i.e. aggregate labor supply has to equal aggregate labor demand

$$N_t^s = N_t^d. \quad (3.31)$$

We require the labor market in East Germany to be in positive net supply

$$N_t^{s,*} \geq N_t^{d,*}. \quad (3.32)$$

Aggregate labor supply has to be bigger or equal aggregate labor demand. In case the difference between supply and demand in the East German labor market is positive, there is involuntary unemployment.⁴⁴ In equilibrium the probability of involuntary unemployment expected by East Germans, ψ_t has to equal the realized rate of involuntary

⁴¹Involuntary unemployment is assigned randomly. As entrepreneurs hire 'efficiency units' they are indifferent between hiring few very capable or many less efficient workers.

⁴²For explicit aggregation of the components of the equilibrium equations see Appendix A.2.

⁴³See Appendix A.2 for an explicit definition of aggregate moving costs as well as the laws of motions for entrepreneurs in East and West Germany.

⁴⁴Migration and occupational choices are only altered until expected involuntary unemployment is equal to the realized rate. An individual who finds himself involuntarily unemployed cannot reconsider his choice in the same period.

unemployment, i.e.

$$\psi_t = \frac{N_t^{s,*} - N_t^{d,*}}{P_{t+1}^*}, \quad (3.33)$$

where P_{t+1}^* denotes the East German population of next period.⁴⁵

We can now define an equilibrium for the model economy after reunification.⁴⁶ Given an initial aggregate capital stock X_t , an initial fraction of entrepreneurs L_t^1 for West Germany, and their intelligence Q_{t-1} , a government policy, $\{\tau, \varsigma, \lambda_t, \chi_t\}$, moving costs $\{\eta_t^j, \eta_t^{*,j}\}$ for $j \in \{h, l\}$ and prices for labor and capital as well as a probability of involuntary unemployment in East Germany $\{w_t, R_t, \psi_t\}$, an equilibrium is a collection of $\{c_t(z_t^p, \eta_t^j; \cdot), c_t(z_t^p, \eta_t^{*,j}; \cdot), b_t(z_t^p, \eta_t^j; \cdot), b_t(z_t^p, \eta_t^{*,j}; \cdot), \hat{z}_t^{p,j}, \hat{z}_t^{*,p,j}, \hat{q}_t, \hat{q}_t^*, \tilde{z}_t^j, \tilde{z}_t^{*,j}, \tilde{q}_t^j, \tau_t^u, G_t\}$ for $p \in \{0, 1\}$ and $j \in \{h, l\}$ such that:

1. $\{c_t(z_t^p, \eta_t^j; \cdot), b_t(z_t^p, \eta_t^j; \cdot), \hat{z}_t^{p,j}, \hat{q}_t, \tilde{z}_t^j\}$ solves the individual's problem for West Germans of types $p \in \{0, 1\}$ and $j \in \{h, l\}$;
2. $\{c_t(z_t^p, \eta_t^{*,j}; \cdot), b_t(z_t^p, \eta_t^{*,j}; \cdot), \hat{z}_t^{*,p,j}, \hat{q}_t^*, \tilde{z}_t^{*,j}, \tilde{q}_t^j\}$ solves the individual's problem for East Germans of types $p \in \{0, 1\}$ and $j \in \{h, l\}$ who are not involuntarily unemployed;
3. for those individuals in East Germany who are involuntarily unemployed optimal decisions about personal consumption and bequests coincide with those of voluntarily unemployed individuals;
4. the rate of involuntary unemployment coincides with East Germans's expectations, equation 3.33 holds;
5. markets, for goods, capital and labor in West Germany clear;
6. the East German labor market is in positive net supply or inactive;
7. (τ_t^u) is such that the unemployment insurance is self-financing, equation 3.28 holds;
8. government consumption is positive, equation 3.27 holds with $G_t \geq 0$.

⁴⁵Given that there is no exogenous population growth the East German population of the next generation coincides with the current population after migration decisions have been made.

⁴⁶Contrariwise to the equilibrium for West Germany before reunification, the equilibrium after reunification is not competitive, given the imposed wage in the East German labor market.

3.4 Calibration

For the extended model economy, I maintain parameters values as calibrated for the basic model (see Table 2.2).⁴⁷ However, some additional parameters need to be specified. I fix values for the discount on wages as well as initial values for relative population size, capital stock, and TFP a priori and calibrate values for the discount on the rental rate, the fraction of mobile Germans, and their moving costs in order to match certain reunification statistics.

In 1991, wages in East Germany were set to 50% of West German wages and by 1995, they were fixed at 70% and more of West German wages. I use an intermediate value and set λ_t to 0.4. The original population of the GDR was equal to one fourth the size of the West German population.⁴⁸ In order to estimate the initial capital stock of the East German economy, I use data on the German gross capital stock measured in prices of 2000, from the Statistisches Bundesamt [2006] and [2009]. In 1991, the per-capita capital stock of East Germany was less than half the per capita capital stock of West Germany, i.e. $X_t^* = 0.43X_t$. Burda [2007] reports that East German labor productivity in 1991 was equal to 44% of West German labor productivity. This translates into TFP in East Germany being a little over half of TFP in West Germany, $A_t^* = 0.6247A_t$.⁴⁹ The remaining parameters, the discount on the rental rate of capital in East Germany χ_t , the fraction of mobile individuals θ , and their moving costs η_t^l are calibrated to match the targets displayed in Table 3.4.

Table 3.4: Calibration Targets for the Extended Model Economy

	Target	Model
East-West Net Migration as % of Eastern Population	7.5%	6.9%
Investment Aid to West German GDP	1%	1.23%
Reduction in Employment after Reunification in East Germany	50%	50%

The discount on the rental rate of capital in East Germany χ_t , is calibrated to a value of 0.35 to match a ratio of investment-aid to West German GDP of 1%. According to

⁴⁷Alesina and Fuchs-Schündeln [2005] find that it takes two generations for East German preferences to convert to those of West Germans. Assuming a different value for the preference parameter ω , for East Germans does not have a direct effect on their occupational choices.

⁴⁸The mass of the entire German population is normalized to one; P_t individuals live in West Germany and $P_t^* = 1 - P_t$ individuals live in East Germany. After reunification, migration may alter the population size of East and West Germany.

⁴⁹The ratio of labor productivities (E_t) and the TFP ratio are related according to: $\frac{E_t^*}{E_t}^{(1-\nu)\gamma} = \frac{A_t^*}{A_t}$.

Wurzel [2001] between 1991 and 1995 annual public transfers for support to enterprises and business-near infrastructure were in the range of 0.63% and 0.99% of West German GDP.⁵⁰ The fraction of mobile individuals θ , is assigned a value of 0.5 to match that net migration from East Germany between 1989 and 2002 amounted to 7.5% of the original population of East Germany. I calibrate moving costs of mobile Germans η_t^l , to a value equal to the model’s estimate of half per-capita GDP of a pre-reunification generation, in order to match a fall in total employment in East Germany after reunification of 50% as reported by Lange [1996].⁵¹ Table 3.5 contains all additional parameter values for the extended model economy.

Table 3.5: Additional Parameters for the Extended Model Economy

Discount on East German Wages (λ_t)	0.4
Initial Ratio of East to West German Population	0.25
Initial Ratio of East to West German Capital Stock	0.43
Initial Ratio of East to West German TFP	0.6247
Discount on East German Rental Rate (χ_t)	0.35
Fraction of Mobile Germans (θ)	0.5
Moving Costs for Mobile Germans (η_t^l)	$0.5 \frac{Y_{t-1}}{P_{t-1}}$

3.5 Results

I first simulate the extended model economy for one period and compare the model’s results with reunification statistics. Then in order to be able to provide some future outlook for East Germany given the current reunification scenario, I simulate the extended model economy for six additional generations and discuss the results.

3.5.1 Results - After One Generation

The extended model economy hits the calibration targets of Table 3.4 well. Table 3.6 displays additional results of the model for one generation after reunification. Results show a clear lack of entrepreneurship in East Germany as pointed out by the OECD [2007a].

⁵⁰These do not include special depreciation allowances, debt servicing expenditure and credits.

⁵¹This strong fall in employment between 1989 and 1993 was partly due to an important reduction in the female participation rate as well as massive early retirement schemes. Moving costs for East Germans $\eta_t^{*,j}$ are assumed to be equal to moving costs for West Germans. Immobile Germans face infinitely high moving costs, $\eta_t^h = \infty$.

After reunification only 3.8% of East Germans set up their business in East Germany. This result of the model is also consistent with findings by Diewald et al. [2006], who study life-courses of East Germans after reunification and find that transitions into self-employment between 1992 and 1996 have been “surprisingly rare”. In particular, they find that “only 4.1 percent of our sample made this step during the Window of opportunity [1/90-6/92], and 3.8 percent did so in the second period [7/92-3/96]” (pg.73).⁵² In the model, 5.8% of the East German population sets up their own business, but 38% of them do so in West Germany. However, no West German migrates to East Germany to set up a business there. Among mobile East Germans, it is the most intelligent who move to West Germany to set up businesses there. Hence, while the fraction of West Germans who become entrepreneurs remains stable at 7.8%, due to migration the fraction of entrepreneurs in West Germany increases to 8.2%. In addition, these entrepreneurs are more intelligent. While before reunification entrepreneurs in West Germany were on average 1.97 times more intelligent than the average individual, this number increases to 2.04. Thus, due to an inflow of intelligent entrepreneurs from East Germany, West German TFP growth increases from an annual rate of 1.5% before reunification to 1.6%. On the other hand, the few East Germans who set up businesses in East Germany are less intelligent entrepreneurs and thus TFP growth in East Germany is low at 0.81%. On the aggregate, 7.4% of individuals set up their own business and TFP grows at an annual rate of 1.4%, 0.1 percentage points less than before reunification.

Reduced TFP growth leads to a slight increase in the value of parental background. Having had a parent who was an entrepreneur increases one’s managerial ability by 55%, ($\phi = 0.55$). However, despite this increase the fraction of individuals from an entrepreneurial background who become entrepreneurs falls slightly, from 63.5% to 63%, while the fraction of those from a working family background increases from 3.2% to 3.7%. This is due to the fact that all East German entrepreneurs have a working family background.⁵³ The fraction of East Germans who become entrepreneurs in East Germany is similar to the fraction of West German entrepreneurs from a working family background before reunification, consistent with findings by Diewald et al. [2006] that “[t]he amount of upward mobility [of East Germans after transition] was of minor importance and did not exceed the amount we know for West Germany during the same period.” (pg.71).

⁵²By 2009, self-employment rates in East and West Germany of around 8% have become very similar. However, this statistic includes professionals without employees and between 2003 and 2006 unemployed who were paid additional benefits conditional on setting up their own business (‘Ich-AG’). A better statistic for entrepreneurship is the ‘possible outcome’ of self-employment, the number of enterprises per inhabitants (see Figure 1.2).

⁵³According to Solga [2006], *elite reproduction* (i.e. outflow from *nomenklatura* to upper service class positions) in East Germany was limited and education and acquired skills rather than party membership were the dominant criteria for elite recruitment after 1989.

Table 3.6: Reunification: Results After One Generation

Entrepreneurship	
Entrepreneurs	7.4%
Entrepreneurs in East Germany	3.8%
East Germans Becoming Entrepreneurs	5.8%
... of those going West	38.4%
Entrepreneurs in West Germany	8.2%
West Germans Becoming Entrepreneurs	7.8%
... of those going East	0
Entrepreneurial Background Individuals Becoming Entrepreneurs	63%
Working Background Individuals Becoming Entrepreneurs	3.7%
Value of Entrepreneurial Background	0.55
Relative Average Intelligence of Entrepreneurs	2.09
... in West	2.04
Germany	
Annual Capital-Output Ratio	2.05
Annual Rental Rate of Capital	7.4%
Unemployed	14.3%
Annual Change in per capita GDP	1.4%
Annual Growth Rate of TFP	1.4%
Government Revenue to GDP	12%
Government Revenue Used for Investment Aid	9.5%
Taxes Paid in West Germany	93%
Contribution to Unemployment Insurance	2.7%
Contribution in East Germany	7.1%
Unemployment Benefits Paid in East Germany	65%
West Germany	
Annual Output per Capita West to East	3
Annual Growth Rate of TFP	1.59%
Annual Growth Rate of GDP	2.1%
Unemployed	6.1%
Average Firm Size	10.4
Annual Capital-Output Ratio	1.91
East Germany	
Average Capital Demand East to West	1.1
Annual Growth Rate of TFP	0.81%
Unemployed	50%
of those voluntarily unemployed	55%
Workers going West	9.9%
Average Firm Size	12.1
Moving Costs to annual GDP per capita East	18.8%
Annual Capital-Output Ratio	2.94

In the first generation after reunification, GDP per capita increases by 1.4% annually, significantly lower than the annual GDP growth rate of 2.1% for West Germany before reunification. But while West German GDP per capita continues to grow at 2.1%, low output in East Germany causes low growth on the aggregate. Per capita GDP in East Germany equals one third of per capita output in West Germany because East German TFP is only two thirds of West German TFP and 50% of the East German population is unemployed. Almost half of them are involuntarily unemployed due to the wage policy that impedes a clearing of the labor market. The other half prefers unemployment given that benefits are as high as in West Germany, while wages are only equal to 60% of West German wages. Due to the high unemployment rate in East Germany, aggregate unemployment almost triples and is up at 14%. More unemployed individuals and unchanged unemployment benefits require an increase in the contribution to unemployment insurance and after reunification, both employers and employees each contribute 2.7% of workers' gross income to the unemployment insurance scheme. And while 65% of unemployment benefits are paid out in East Germany, East German workers and entrepreneurs contribute only 7% to unemployment insurance. In addition, the increased contribution makes working less attractive and thus also in West Germany there is a slight increase in unemployment to 6.1%.

While there are no explicit transfers from West to East Germany in the model, implicitly income in East Germany is heavily subsidized by West German contributions.⁵⁴ And not only the income of the unemployed; workers and entrepreneurs in West Germany contribute 93% to government revenues, while 10% is used for investment aids for entrepreneurs in East Germany. Low contributions by East Germans and unchanged tax rates lead to a slightly lower ratio of tax revenues to GDP after reunification of 12%. Consistent with data showing that the small and medium sized sector is relatively more important in West than in East Germany, in the model entrepreneurs in East Germany hire on average two more workers than entrepreneurs in West Germany.⁵⁵ Still, around 10% of East German workers migrate to West Germany to work there. Their moving costs and those of East Germans who migrate to West Germany to set up a business are equal to around 19% of the annual East German GDP per capita. After reunification, the annual rental rate of capital of 7.4%, is a little higher than before reunification due to an increased demand for capital by East German firms. Investment aids in form of reduced rental rates for capital lead to capital demand of East German firms being 10% higher

⁵⁴Nor are there in the data; the so called 'Solidaritatsbeitrag'- an additional tax rate to finance East Germany's reconstruction is paid by East and West Germans alike.

⁵⁵Data from the Statistische Bundesamt [2008a] that in 2004 there were 39 and 33.8 firms with 0-9 employees, 2.9 and 2.7 firms with 10-49 and 0.7 and 0.7 firms with 50 and more employees in West and East Germany respectively (per 1000 inhabitants).

than the capital demand of the average West German firm. The higher capital intensity of production in East Germany results in an East German capital-output ratio of 2.9, i.e. 1.5 times the capital-output ratio in West Germany (1.9). The overall capital-output ratio of 2.05 is now slightly higher than before reunification.

“For the productivity of the east to reach 90 per cent of the west’s by 2020, the economy there would have to grow by 4-5 per cent a year,’ the experts said.” (Financial Times [2004b]). Stakes for East Germany to reach West German levels of output were set high. And instead of catching up with West Germany, the East German economy was and is still characterized by high involuntary unemployment, few entrepreneurs, and low economic growth while the most intelligent East Germans continue to migrate to West Germany. The model’s result for one period after reunification reflect these observations.

3.5.2 Results- After Six Generations (2130)

While simulating the model economy for more periods can provide some future perspectives, these cannot be contrasted with any data. However, demographic forecasts for East Germany turn out to coincide with some of the model’s predictions. Simulating the model economy for six generations I maintain the value for the discount on wages. However, as there are fewer entrepreneurs in East than in West Germany, I assume that the government increases the investment aid. Each period the discount on the rental rate of capital χ_t , is adjusted according to the following rule

$$\chi_{t+1} = \min(1, \max(\chi_t, \log(e^{\chi_t + \Delta_{diff_t}}))),$$

where Δ_{diff_t} denotes the change in the difference between the fraction of entrepreneurs in West and East Germany.⁵⁶ As East and West Germans become more alike, I assume that moving costs relative to GDP decrease over time, maintaining the absolute value of moving cost for mobile Germans η_t^l , constant.⁵⁷

Table 3.7 displays the model’s results for the sixth generation after reunification. While the situation for West Germany has changed little – rates of unemployment, fraction of entrepreneurs, and GDP growth remain stable – the situation in East Germany is

⁵⁶Formally defined as $\Delta_{diff_t} = \frac{L_{t+1}^1 - L_{t+1}^{*,1}}{L_{t+1}^1} - \frac{L_t^1 - L_t^{*,1}}{L_t^1}$

⁵⁷Table A-4 of Appendix A.4 shows the evolution of relative moving costs and the discount on the rental rate of capital, χ_t , for the eight periods. Note that the value of parental background ϕ_t will be determined by overall TFP growth in Germany that in turn depends on the intelligence of all German managers.

Table 3.7: Reunification: Results After Six Generations

Entrepreneurship	
Entrepreneurs in East Germany	0.2%
East Germans Becoming Entrepreneurs	3.2%
... of those going West	93%
Entrepreneurs in West Germany	8%
West Germans Becoming Entrepreneurs	8%
... of those going East	0
West Germany	
Annual Growth Rate of TFP	1.5%
Annual Growth Rate of GDP	2.2%
Unemployed	5.8%
East Germany	
Annual Growth Rate of TFP	0.81%
Accumulated Net migration to Population East	91.6%
Unemployed	98%
of those voluntarily unemployed	32.5%
Workers going West	97.8%

characterized by empty regions with very few active individuals. Six generations after reunification almost 92% of the original population of East Germany has left. Despite the increased investment aid, in East Germany there are even fewer entrepreneurs than before. While 3.2% of the East German population sets up their own business, 93% of them do so in West Germany; i.e. only 0.2% of East Germans set up their business in East Germany. This is qualitatively consistent with estimations by Ragnitz and Schneider [2007] who predict numbers of newly self-employed in East Germany to decrease with respect to 2002 by about 15% in 2010 and by almost 30% in 2020. And few entrepreneurs imply low employment; only 2% of the East German labor force is working even though many would prefer to do so. Two thirds of all unemployment in East Germany is involuntary. Given a high probability of involuntary unemployment 98% of East German workers migrate to West Germany. Low ability individuals and immobile individuals stay behind. In the following generation these individuals are replaced by a child of random intelligence who is immobile or mobile with a probability of 50%. And of these children only the least able and the immobile stay in East Germany. This process repeats itself the following generation. The East German population is thus continuously shrinking. If intelligence of parents and children were positively correlated in this model, over time the East German population would be reduced to least able individuals only. While the model's scenario is obviously an extreme case, numerous newspaper articles, as "Geschichten vom Ver-

schwinden” (Tagesspiegel 27.05.2006) or “Waiting for the East to flourish”, (BBC News, 09/09/2005) or “Wieder der doofe Rest” (Spiegel, 3/2002), or “Tearing itself down; Depopulation of eastern Germany” (The Economist, 12/04/2008) have been discussing the situation of deserted regions in East Germany.⁵⁸

4 Counterfactual Experiments

Given prospects of a deserted East Germany, the question arises: How could East Germany’s growth experience been different? Especially the wage-setting policy seems to oppress incentives to become an entrepreneur. In addition social rigidities in West Germany that assign an important role to parental background make it difficult for East German individuals who want to set up their own business to compete with West Germans in terms of managerial ability. And free migration implies an attractive outside option for East Germans to work or set up a business in West Germany. In this section I perform three counterfactual experiments that assume for the first period after reunification, 1) East Germany having flexible wages, 2) East Germany integrating into a socially mobile West Germany, and 3) migration restriction for East and West Germans. Results of all experiments are presented face to face with results for one period after reunification (Benchmark results).

4.1 Flexible Wages

In this counterfactual experiment I allow for wages to freely adjust in each of the locally separated labor markets. I assume that investment aids, moving costs, and unemployment benefits paid are maintained as specified in Tables 2.2 and 3.5.⁵⁹ Table 4.8 displays results of this counterfactual experiment. If wages in East Germany are to adjust freely, they are slightly lower – -1.3% – than when imposed as a fraction of West German wages as in the Benchmark scenario. In the flexible wage scenario, these lower wages translate into higher profits for entrepreneurs, and a larger fraction of East Germans set up a business, 5.7% compared to 3.8%. As individuals of lower managerial ability opt for setting up their own business, the average firm size drops. Given more entrepreneurs, the unemployment

⁵⁸A study of the Berlin Institut [2007] shows that high rates of migration in some regions of East Germany can be linked to local issues of increasing crime and radical political movements.

⁵⁹Note that the guess on involuntary unemployment in East Germany in this case is zero and Equation 3.19 reduces to $(1 - \tau_t^u - \tau)(1 - \lambda_t)w_tq$. In order to avoid introducing a motive for unemployed to migrate as well, unemployment benefits in both parts of Germany are specified as fractions of West German wages.

Table 4.8: Fully Flexible Wages

	Flexible Wages	Benchmark
Wage per efficiency unit East to West	0.59	0.6
Entrepreneurs in East	5.7%	3.8%
Unemployed East	28%	50%
of those voluntarily unemployed	100%	55%
Annual Growth Rate of TFP East	1.19%	0.81%
Annual Growth Rate of TFP West	1.55%	1.59%
Annual Growth Rate of TFP Total	1.48%	1.44%
Annual Output per capita East	1.374	1
Annual Output per capita West	0.996	1
Total Annual Output per capita	1.024	1
Net migration to Population East	7.7%	6.9%
Entrepreneurs going West	28.8%	38.4%
Workers going West	8.3%	9.9%
Average Firm Size East	11.7	12.1

rate in East Germany drops and is entirely due to voluntary unemployment; i.e. 28% of East Germans decide not to work. Less unemployment leads to more output; per capita output in East Germany is 37% higher and more entrepreneurs cause East German TFP to grow at an annual rate of 1.19%, an increase of almost 50% compared to the Benchmark scenario. In West Germany on the other hand, there are fewer intelligent entrepreneurs from East Germany which leads to a reduction in output per capita and TFP growth under the flexible wage scenario. However, the positive effect for East Germany dominates and overall TFP growth and output per capita are higher given flexible wages. Given that consumption is a fixed fraction of output in this model, flexible wages are welfare improving. However, as supposedly feared by labor unions who pressed for equal wages in East and West Germany, lower wages in East Germany fuel migration to West Germany. Whereas under the Benchmark scenario 6.9% of East Germans left in the first period after reunification, given flexible wages 7.7% of East Germans leave.

4.2 Integration into Socially Mobile West Germany

If East Germany had integrated into a social mobile economy, where an individual's managerial ability was solely defined by his intelligence, the initial disadvantage of missing generations of entrepreneurs in East Germany would have become obsolete. For this counterfactual experiment I maintain the wage and rental rate discounts for East Germany but

set the value of parental background in entrepreneurship to zero. Average managerial ability is the same for East and West Germans.⁶⁰ Table 4.9 displays the model's results for the

Table 4.9: Integration into Socially Mobile Economy

	Integration into Socially Mobile Economy	Benchmark
Entrepreneurs in East	6.3%	3.8%
Unemployed East	25%	50%
of those voluntarily unemployed	100%	55%
Annual Growth Rate of TFP East	1.38%	0.81%
Annual Growth Rate of TFP West	1.77%	1.59%
Annual Growth Rate of TFP Total	1.7%	1.44%
Annual Output per capita East	1.542	1
Annual Output per capita West	0.996	1
Total Annual Output per capita	1.035	1
Net migration to Population East	7.6%	6.9%
Entrepreneurs going West	41%	38.4%
Workers going West	5.3%	9.9%
Average Firm Size East	10.9	12.1
Entrepreneurial Backgr.		
Indvs. Becoming Entrepreneurs	5.6%	63%
Working Backgr.		
Indvs. Becoming Entrepreneurs	6.5%	3.7%

integration of East Germany into a socially mobile economy. If East Germany integrates into a socially mobile economy, the fraction of East Germans who become entrepreneurs is almost 40% higher. As wages in West Germany and thus also in East Germany are lower due to reduced managerial ability, 6.3% instead of 3.8% of East Germans set up their own business in East Germany. As individuals of lower managerial ability opt for setting up their own business, the average firm size drops. Unemployment is reduced by half from 50% to 25%, and is entirely due to voluntary unemployment. The fixed wage setting is thus not binding in this scenario. The lower unemployment rate is only slightly due to more migration to West Germany. 7.6% of East Germans migrate to West Germany compared to 6.9% in the Benchmark case. However, the composition of migrants changes. More East Germans migrate to West Germany to set up their business there and fewer East Germans migrate to work in West Germany. Higher employment leads to more output. East Germany now produces 54% more output per capita and its TFP grows at

⁶⁰However, in order for the average German managerial ability in this scenario to be equal to the one in the reunification scenario the parameter for the mean log-managerial ability μ is raised to 2.144.

a rate that is 70% higher compared to the Benchmark case. Given, no additional value of parental background, managerial ability in West Germany is reduced which leads to a reduction in output per capita. However, as talent is optimally allocated West German TFP growth is higher under this scenario than in the Benchmark case. Concerning output per capita, the positive effect for East Germany dominates and again overall output per capita is higher given the integration into a socially mobile West Germany and welfare improves with respect to the Benchmark scenario, given that individuals consume a fixed fraction of output in this model. As parental background has no value, the fraction of entrepreneurs coming from an entrepreneurial family background is reduced to values for individuals coming from a working family background. The fact that the latter fraction is slightly larger than the former, 6.5% versus 5.6% is entirely due to the fact that all East German entrepreneurs are children of workers. For West German individuals these fractions are identical.

4.3 Migration Restriction

If East Germans are not allowed to migrate their occupational choices are those of West Germans before reunification. For this policy experiment I maintain all parameter values as well as the wage and rental rate discounts for East Germany but assume that all East and West Germans are immobile, i.e. have infinitely large moving costs.⁶¹ Table 4.10 displays the model's results for the case of no migration between East and West Germany. Without the option to migrate 6.5% of East Germans decide to set up their own business. This fraction is only slightly lower than the one for West Germans. The difference is mainly due to the fact that voluntary unemployment remains high at 27%, as unemployment benefits are relatively high compared to wages. As individuals of lower managerial ability opt for setting up their own business, the average firm size drops. As all intelligent entrepreneurs who opt for migration under the reunification scenario set up their businesses in East Germany given migration restrictions, TFP growth is high at 1.66% annually, more than double the TFP growth in the Benchmark case. More and better entrepreneurs and higher employment lead to more output. Without the option to migrate East German per capita output is 74% larger compared to the Benchmark scenario. In West Germany on the other hand, there are fewer intelligent entrepreneurs from East Germany which leads to a reduction in output per capita and TFP growth. In the case of complete restrictions on migrations the negative effects for West Germany dominate and overall TFP growth and output per capita are lower compared to the Benchmark scenario and thus welfare is being reduced.

⁶¹I set the fraction of mobile Germans (θ) to zero.

Table 4.10: Migration Restrictions

	No Migration	Benchmark
Entrepreneurs in East	6.5%	3.8%
Unemployed East	27%	50%
of those voluntarily unemployed	100%	55%
Annual Growth Rate of TFP East	1.67%	0.81%
Annual Growth Rate of TFP West	1.33%	1.59%
Annual Growth Rate of TFP Total	1.4%	1.44%
Annual Output per capita East	1.735	1
Annual Output per capita West	0.886	1
Total Annual Output per capita	0.941	1
Average Firm Size East	10.3	12.1

5 Conclusion

The following two quotes contain the essence of this paper “To summarize our results suggest that blaming the East Germans for lacking competencies needed for an economic takeoff in East Germany is not appropriate. East Germans did not generally lack self-initiative and effort. In contrast, these resources, even though existing, have not yet been mobilized adequately in the institutional and political setting of the East German transformation process. This gives credit to the story that sees the East German situation as a further indicator for the crisis of the *West* German labor market institutions;” (Diewald et al [2006]). Similarly stated by the Financial Times [2004a]: “With unification, the east has inherited all the labor and product market rigidities of the west” “Germany may be one country, but it is still two separate economies” “A blueprint for the revival of the east German economy requires a radically new approach.” “East Germans needs a second chance and a second start or else it faces the prospect of economic misery for another generation and possibly longer.”

East Germany’s post-1989 experience is and has been remarkably different from that of other transition countries. Its integration into an established and highly regulated economy hindered a fruitful development of entrepreneurial activity. While East Germany is still suffering the consequences of its lack of entrepreneurship, as high rates of unemployment and low economic growth, other transition countries are flourishing. When parental background in entrepreneurship is nonexistent the most intelligent individuals become entrepreneurs. They innovate and contribute to economic growth. This optimal allocation of talent did not happen in East Germany. Especially the West German policy of fixing wages in East Germany at a fraction of West German wages oppressed incen-

tives to set up businesses. In addition the option to migrate to West Germany drew in the most intelligent and mobile East Germans, while the importance of entrepreneurial parental background in West Germany, implied an initial disadvantage for East Germans who lacked any entrepreneurial tradition.

Prospects for East Germany are devastating and speak of deserted regions. Counterfactual experiments show that East Germany's experience could have been better had wages been flexible in East and West Germany, had West Germany been a socially mobile economy where parental background in entrepreneurship played no role, or had migration to West Germany been very costly. However, while flexible wages and a social mobile West Germany would have also led to more output and higher economic growth for all of Germany, migration restrictions would have been exclusively beneficial to East German output and economic growth. The lack of entrepreneurship, employment, and economic growth in East Germany would have been less severe had West German policy makers opted for flexible wages in both parts of Germany. However, this policy as feared by many would have implied increased migration from East to West Germany. Based on the calibration of the model, in a world of flexible wages 140.000 more East Germans would have migrated to work or set up a business in West Germany. It seems unlikely that the cost of this additional migration would have outweighed the actual costs of low economic growth and unemployment in East Germany.

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A Appendix

A.1 Additional Comparisons for Optimal Occupational Choices

Some of the comparisons individuals make in order to make their optimal occupational choice were omitted in the main body of the paper in order to keep the discussion tractable. However, individuals have to compare among each occupation and rank them in order to make the right choice. Here I present additional comparisons as well as the resulting consequences for equilibrium equations.

West Germans West Germans also compare their wage income to profits from setting up a business in East Germany. Whenever $\pi_t(z_t^p, A_t^*, \eta_t^j; \cdot) \geq (1 - \tau_t^u - \tau)w_tq$, they decide to set up a business in East Germany instead of working in West Germany. However, the threshold resulting from this choice is only relevant whenever $\tilde{z}_t^j \geq 0$, and $\tilde{z}_t^j \leq \hat{z}_t^p$, i.e. whenever the marginal entrepreneur who sets up his business in East Germany exists and is less able than the marginal entrepreneur in West Germany. In this case no West German would want to set up his business in West Germany. In this case in all equilibrium equations one would have to substitute: the new threshold for \hat{z}_t^p and to substitute \tilde{z}_t^p for \tilde{z}_t^j . This situation can be ruled out a priori as a non-equilibrium case because there would not be any labor demand in West Germany. If West Germans find it profitable to migrate to East Germany to set up a business there, discounts on wages and rental rate are high enough to offset the lower East German TFP. In this case East Germans will not find it profitable to set up a business in West Germany and hence there will not be

any entrepreneurs in West Germany. However, for equilibrium I require the West German labor market to clear.

Individuals in West Germany also compare unemployment benefits to profits from setting up a business in East Germany. Whenever $\pi_t(z_t^p, A_t^*, \eta_t^j; \cdot) \geq v_t$, they decide to set up a business in East Germany instead of being unemployed. Only if $\tilde{z}_t^j \geq 0$ and $\tilde{z}_t^j \leq \hat{z}_t^p$ and $\tilde{z}_t^j < q_t^*$ does this choice become relevant, i.e., whenever the marginal entrepreneur who sets up his business in East Germany exists and is less able than the marginal entrepreneur in West Germany and also less intelligent than the marginal worker. Then no West German would want to work or set up his business in West Germany. This situation can be ruled out a priori as a non-equilibrium case because unemployment benefits are the same for East and West Germans, and hence if there is no West German who wants to work or set up a business in West Germany neither will there be any East German, given that in addition he will face a moving costs to do so.

East Germans East German individuals also compare working in East Germany to setting up a business in East Germany. Whenever $\pi_t(z_t^p, A_t^*; \cdot) \geq (1 - \psi_t)(1 - \tau_t^u - \tau)(1 - \lambda_t)w_tq + \psi_t\zeta w_t$ they set up their own business in East Germany. However, this choice is only relevant whenever the resulting threshold is smaller than the one coming from the choice between working in East or West Germany (\tilde{q}_t^j). In this case the marginal worker who goes to West Germany is more intelligent than the marginal entrepreneur in East Germany. Then only if the profit function for entrepreneurs in East Germany and the function for wage income in West Germany cross twice will there be any East German working in West Germany. In all equilibrium equations one would have to substitute the new threshold for $\hat{z}_t^{*,p,j}$ and possibly \tilde{q} for the second crossing of the profit function for entrepreneurs in East Germany and the function for wage income in West Germany.

East Germans compare incomes from working in West Germany to profits from setting up a business in West Germany. Whenever $\pi_t(z_t^p, A_t, \eta_t^{*,j}; \cdot) \geq (1 - \tau_t^u - \tau)w_tq - \eta_t^{*,j}$, they decide to set up a business in West Germany instead of working there. This occupational choice is only relevant whenever the marginal entrepreneur who sets up his business in West Germany exists and is less able than the marginal entrepreneur in East Germany. Then, depending on the curvature of the profit function there might be no East German who wants to set up his business in East Germany. It could also be the case that those with lower ability than the marginal worker who migrates to West Germany set up their businesses in East Germany. A situation with no East German setting up a business in East Germany cannot be ruled out a priori as a non-equilibrium case. If East Germans

find it profitable to go to West Germany to set up a business there, discounts on wages and rental rate are not large enough to offset the lower TFP in East Germany. Hence, neither will West Germans set up a business in East Germany and there will be no labor demand in East Germany. All workers who stay in East Germany will be involuntary unemployed.

Individuals in East Germany also compare working in East Germany to setting up a business in West Germany. Whenever $\pi_t(z_t^p, A_t, \eta_t^{*,j}; \cdot) \geq (1-\psi_t)(1-\tau_t^u-\tau)(1-\lambda_t)w_tq+\psi_t\zeta w_t$, they decide to set up a business in West Germany instead of working in East Germany. Again this choice is only relevant if the marginal entrepreneur who sets up his business in West Germany exists and is less able than the marginal entrepreneur in East Germany and the marginal worker who migrates to West Germany and with no East German wanting to work in West Germany or setting up his business in East Germany.

Thresholds resulting from comparing unemployment benefits to wages paid in West Germany, or possible profits earned in East or West Germany, are never relevant. Situations in which they could matter are ruled out, given that West Germans only migrate to East Germany to set up their businesses there.

A.2 Explicit Aggregation of Components of Equations

Denote by $n_t(z_t^p, A_t; \cdot)$, $k_t(z_t^p, A_t; \cdot)$, and $y_t(z_t^p, A_t; \cdot)$ demands for labor and capital services and supply of goods by an entrepreneur born in West Germany who has managerial ability z_t^p and who sets up his business in West Germany. Demands and supply of entrepreneurs born in East Germany who set up their businesses in West Germany are $n_t(z_t^p, A_t, \eta_t^{*,j}; \cdot)$, $k_t(z_t^p, A_t, \eta_t^{*,j}; \cdot)$, and $y_t(z_t^p, A_t, \eta_t^{*,j}; \cdot)$. Demands for labor and capital and supply of goods by entrepreneurs born in East Germany who set up their businesses in East Germany are denoted by $n_t(z_t^p, A_t^*; \cdot)$, $k_t(z_t^p, A_t^*; \cdot)$, and $y_t(z_t^p, A_t^*; \cdot)$, whereas entrepreneurs born in West Germany who set up their businesses in East Germany demand $n_t(z_t^p, A_t^*, \eta_t^j; \cdot)$ and $k_t(z_t^p, A_t^*, \eta_t^j; \cdot)$ and supply $y_t(z_t^p, A_t^*, \eta_t^j; \cdot)$. The population of West Germany is denoted by P_t . P_t^* denotes the East German population.

Labor demand in West Germany after reunification:

$$\begin{aligned}
N_t^d = & \theta L_t^0 \int_{\hat{z}_t^0}^{\bar{z}_t^h} n_t(z_t^0, A_t; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^0}^{\bar{z}_t^l} n_t(z_t^0, A_t; \cdot) f(q) dq + \\
& + \theta L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^h} n_t(z_t^1, A_t; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^l} n_t(z_t^1, A_t; \cdot) f(q) dq + \\
& + \theta L_t^{*,0} \int_{\hat{z}_t^{*,h}}^{\bar{z}_t^0} n_t(z_t^0, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,l}}^{\bar{z}_t^0} n_t(z_t^0, A_t, \eta_t^{*,l}; \cdot) f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{z}_t^{*,h}}^{\bar{z}_t^1} n_t(z_t^1, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,l}}^{\bar{z}_t^1} n_t(z_t^1, A_t, \eta_t^{*,l}; \cdot) f(q) dq.
\end{aligned}$$

Capital demand after reunification:

$$\begin{aligned}
K_t = & \theta L_t^0 \int_{\hat{z}_t^0}^{\bar{z}_t^h} k_t(z_t^0, A_t; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^0}^{\bar{z}_t^l} k_t(z_t^0, A_t; \cdot) f(q) dq + \\
& + \theta L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^h} k_t(z_t^1, A_t; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^1}^{\bar{z}_t^l} k_t(z_t^1, A_t; \cdot) f(q) dq + \\
& \theta L_t^0 \int_{\hat{z}_t^h}^{\bar{z}_t^0} k_t(z_t^0, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^l}^{\bar{z}_t^0} k_t(z_t^0, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
& \theta L_t^1 \int_{\hat{z}_t^h}^{\bar{z}_t^1} k_t(z_t^1, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^l}^{\bar{z}_t^1} k_t(z_t^1, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
& + \theta L_t^{*,0} \int_{\hat{z}_t^{*,0,h}}^{\bar{z}_t^{*,h}} k_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,0,l}}^{\bar{z}_t^{*,l}} k_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{z}_t^{*,1,h}}^{\bar{z}_t^{*,h}} k_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,1,l}}^{\bar{z}_t^{*,l}} k_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
& \theta L_t^{*,0} \int_{\hat{z}_t^{*,h}}^{\bar{z}_t^0} k_t(z_t^0, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,l}}^{\bar{z}_t^0} k_t(z_t^0, A_t, \eta_t^{*,l}; \cdot) f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{z}_t^{*,h}}^{\bar{z}_t^1} k_t(z_t^1, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,l}}^{\bar{z}_t^1} k_t(z_t^1, A_t, \eta_t^{*,l}; \cdot) f(q) dq.
\end{aligned}$$

Labor supply in West Germany after reunification:

$$\begin{aligned}
N_t^s &= L_t^0 \int_{\hat{q}_t}^{\hat{z}_t^0} qf(q) dq + L_t^1 \int_{\hat{q}_t}^{\hat{z}_t^1} qf(q) dq + \\
&\quad + \theta L_t^{*,0} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,0,h}} qf(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,0,l}} qf(q) dq + \\
&\quad + \theta L_t^{*,1} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,1,h}} qf(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,1,l}} qf(q) dq.
\end{aligned}$$

Labor demand in East Germany after reunification:

$$\begin{aligned}
N_t^{d,*} &= \theta L_t^{*,0} \int_{\hat{z}_t^{*,0,h}}^{\hat{z}_t^{*,h}} n_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,0,l}}^{\hat{z}_t^{*,l}} n_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
&\quad + \theta L_t^{*,1} \int_{\hat{z}_t^{*,1,h}}^{\hat{z}_t^{*,h}} n_t(z_t^1, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,1,l}}^{\hat{z}_t^{*,l}} n_t(z_t^1, A_t^*; \cdot) f(q) dq + \\
&\quad + \theta L_t^0 \int_{\hat{z}_t^h}^{\bar{z}_t^0} n_t(z_t^0, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^l}^{\bar{z}_t^0} n_t(z_t^0, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
&\quad + \theta L_t^1 \int_{\hat{z}_t^h}^{\bar{z}_t^1} n_t(z_t^1, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^l}^{\bar{z}_t^1} n_t(z_t^1, A_t^*, \eta_t^l; \cdot) f(q) dq.
\end{aligned}$$

Labor supply in East Germany after reunification:

$$N_t^{s,*} = \theta P_t^* \int_{\hat{q}_t^*}^{\hat{q}_t^h} qf(q) dq + (1 - \theta) P_t^* \int_{\hat{q}_t^*}^{\hat{q}_t^l} qf(q) dq.$$

Goods supply after reunification:

$$\begin{aligned}
Y_t^{s,*} + Y_t^s &= \theta L_t^0 \int_{\bar{z}_t^0}^{\bar{z}_t^h} y_t(z_t^0, A_t; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\bar{z}_t^0}^{\bar{z}_t^l} y_t(z_t^0, A_t; \cdot) f(q) dq \\
&+ \theta L_t^1 \int_{\bar{z}_t^1}^{\bar{z}_t^h} y_t(z_t^1, A_t; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\bar{z}_t^1}^{\bar{z}_t^l} y_t(z_t^1, A_t; \cdot) f(q) dq + \\
&+ \theta L_t^0 \int_{\bar{z}_t^h}^{\bar{z}_t^0} y_t(z_t^0, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\bar{z}_t^l}^{\bar{z}_t^0} y_t(z_t^0, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
&+ \theta L_t^1 \int_{\bar{z}_t^h}^{\bar{z}_t^1} y_t(z_t^1, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\bar{z}_t^l}^{\bar{z}_t^1} y_t(z_t^1, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
&+ \theta L_t^{*,0} \int_{\bar{z}_t^{*,0,h}}^{\bar{z}_t^{*,h}} y_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\bar{z}_t^{*,0,l}}^{\bar{z}_t^{*,l}} y_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
&+ \theta L_t^{*,1} \int_{\bar{z}_t^{*,1,h}}^{\bar{z}_t^{*,h}} y_t(z_t^1, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\bar{z}_t^{*,1,l}}^{\bar{z}_t^{*,l}} y_t(z_t^1, A_t^*; \cdot) f(q) dq + \\
&+ \theta L_t^{*,0} \int_{\bar{z}_t^{*,h}}^{\bar{z}_t^0} y_t(z_t^0, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\bar{z}_t^{*,l}}^{\bar{z}_t^0} y_t(z_t^0, A_t, \eta_t^{*,l}; \cdot) f(q) dq + \\
&+ \theta L_t^{*,1} \int_{\bar{z}_t^{*,h}}^{\bar{z}_t^1} y_t(z_t^1, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\bar{z}_t^{*,l}}^{\bar{z}_t^1} y_t(z_t^1, A_t, \eta_t^{*,l}; \cdot) f(q) dq.
\end{aligned}$$

Right hand side of government budget constraint after reunification:

$$\begin{aligned}
\tau\Pi_t + (\tau - \tau\tau_t^u)W_t &= \tau\{\theta L_t^1 \int_{\hat{z}_t^{1,h}}^{\hat{z}_t^h} \pi_t(z_t^1, A_t; \cdot) f(q) dq + (1 - \theta)L_t^1 \int_{\hat{z}_t^{1,l}}^{\hat{z}_t^l} \pi_t(z_t^1, A_t; \cdot) f(q) dq + \\
&+ \theta L_t^0 \int_{\hat{z}_t^{0,h}}^{\hat{z}_t^h} \pi_t(z_t^0, A_t; \cdot) f(q) dq + (1 - \theta)L_t^0 \int_{\hat{z}_t^{0,l}}^{\hat{z}_t^l} \pi_t(z_t^0, A_t; \cdot) f(q) dq + \\
&+ \theta L_t^{*,1} \int_{\hat{z}_t^{*,1,h}}^{\hat{z}_t^{*,h}} \pi_t(z_t^1, A_t^*; \cdot) f(q) dq + (1 - \theta)L_t^{*,1} \int_{\hat{z}_t^{*,1,l}}^{\hat{z}_t^{*,l}} \pi_t(z_t^1, A_t^*; \cdot) f(q) dq + \\
&+ \theta L_t^{*,0} \int_{\hat{z}_t^{*,0,h}}^{\hat{z}_t^{*,h}} \pi_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta)L_t^{*,0} \int_{\hat{z}_t^{*,0,l}}^{\hat{z}_t^{*,l}} \pi_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
&+ \theta L_t^1 \int_{\hat{z}_t^h}^{\hat{z}_t^1} \pi_t(z_t^1, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta)L_t^1 \int_{\hat{z}_t^l}^{\hat{z}_t^1} \pi_t(z_t^1, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
&+ \theta L_t^0 \int_{\hat{z}_t^h}^{\hat{z}_t^0} \pi_t(z_t^0, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta)L_t^0 \int_{\hat{z}_t^l}^{\hat{z}_t^0} \pi_t(z_t^0, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
&+ \theta L_t^{*,0} \int_{\hat{z}_t^{*,h}}^{\hat{z}_t^{*,0}} \pi_t(z_t^0, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta)L_t^{*,0} \int_{\hat{z}_t^{*,l}}^{\hat{z}_t^{*,0}} \pi_t(z_t^0, A_t, \eta_t^{*,l}; \cdot) f(q) dq + \\
&+ \theta L_t^{*,1} \int_{\hat{z}_t^{*,h}}^{\hat{z}_t^{*,1}} \pi_t(z_t^1, A_t, \eta_t^{*,h}; \cdot) f(q) dq + \\
&+ (1 - \theta)L_t^{*,1} \int_{\hat{z}_t^{*,l}}^{\hat{z}_t^{*,1}} \pi_t(z_t^1, A_t, \eta_t^{*,l}; \cdot) f(q) dq\} + \\
&+ (\tau - \tau\tau_t^u) \frac{N_t^d}{N_t^s} \{L_t^1 \int_{\hat{q}_t}^{\hat{z}_t^1} w_t q f(q) dq + L_t^0 \int_{\hat{q}_t}^{\hat{z}_t^0} w_t q f(q) dq + \\
&+ \theta L_t^{*,1} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,1,h}} w_t q f(q) dq + \\
&+ (1 - \theta)L_t^{*,1} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,1,l}} w_t q f(q) dq + \theta L_t^{*,0} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,0,h}} w_t q f(q) dq + \\
&+ (1 - \theta)L_t^{*,0} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,0,l}} w_t q f(q) dq\} + \tau^l \frac{N_t^{d*}}{N_t^{s*}} \{\theta L_t^{*,1} \int_{\hat{q}_t^*}^{\hat{q}_t^h} (1 - \lambda_t) w_t q f(q) dq + \\
&+ (1 - \theta)L_t^{*,1} \int_{\hat{q}_t^*}^{\hat{q}_t^l} (1 - \lambda_t) w_t q f(q) dq + \theta L_t^{*,0} \int_{\hat{q}_t^*}^{\hat{q}_t^h} (1 - \lambda_t) w_t q f(q) dq + \\
&+ (1 - \theta)L_t^{*,0} \int_{\hat{q}_t^*}^{\hat{q}_t^l} (1 - \lambda_t) w_t q f(q) dq\}.
\end{aligned}$$

Left hand side of unemployment insurance after reunification:

$$\begin{aligned}
UB_t = & v_t \{ P_t \int_0^{\hat{q}_t} f(q) dq + P_t^* \int_0^{\hat{q}_t^*} f(q) dq + (1 - \frac{N_t^d}{N_t^s}) [L_t^0 \int_{\hat{q}_t}^{\hat{z}_t^0} f(q) dq + L_t^1 \int_{\hat{q}_t}^{\hat{z}_t^1} f(q) dq + \\
& + \theta L_t^{*,0} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,0,h}} f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,0,l}} f(q) dq + \theta L_t^{*,1} \int_{\hat{q}_t^h}^{\hat{z}_t^{*,1,h}} f(q) dq + \\
& + (1 - \theta) L_t^{*,1} \int_{\hat{q}_t^l}^{\hat{z}_t^{*,1,l}} f(q) dq] + (1 - \frac{N_t^{d,*}}{N_t^{s,*}}) [\theta L_t^{*,0} \int_{\hat{q}_t^*}^{\hat{q}_t^h} f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{q}_t^*}^{\hat{q}_t^l} f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{q}_t^*}^{\hat{q}_t^h} f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{q}_t^*}^{\hat{q}_t^l} f(q) dq] \}.
\end{aligned}$$

Right hand side of unemployment insurance after reunification:

$$\begin{aligned}
2\tau_t^u W_t = & 2\tau_u w_t \{ \theta L_t^0 \int_{\hat{z}_t^0}^{\hat{z}_t^h} n_t(z_t^0, A_t; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^0}^{\hat{z}_t^l} n_t(z_t^0, A_t; \cdot) f(q) dq + \\
& + \theta L_t^1 \int_{\hat{z}_t^1}^{\hat{z}_t^h} n_t(z_t^1, A_t; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^1}^{\hat{z}_t^l} n_t(z_t^1, A_t; \cdot) f(q) dq + \\
& + \theta L_t^{*,0} \int_{\hat{z}_t^{*,h}}^{\bar{z}^0} n_t(z_t^0, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,l}}^{\bar{z}^0} n_t(z_t^0, A_t, \eta_t^{*,l}; \cdot) f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{z}_t^{*,h}}^{\hat{z}_t^1} n_t(z_t^1, A_t, \eta_t^{*,h}; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,l}}^{\hat{z}_t^1} n_t(z_t^1, A_t, \eta_t^{*,l}; \cdot) f(q) dq \} + \\
& + 2\tau_u w_t (1 - \lambda_t) \{ \theta L_t^{*,0} \int_{\hat{z}_t^{*,0,h}}^{\hat{z}_t^{*,h}} n_t(z_t^0, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,0,l}}^{\hat{z}_t^{*,l}} n_t(z_t^0, A_t^*; \cdot) f(q) dq + \\
& + \theta L_t^{*,1} \int_{\hat{z}_t^{*,1,h}}^{\hat{z}_t^{*,h}} n_t(z_t^1, A_t^*; \cdot) f(q) dq + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,1,l}}^{\hat{z}_t^{*,l}} n_t(z_t^1, A_t^*; \cdot) f(q) dq + \\
& + \theta L_t^0 \int_{\hat{z}_t^h}^{\bar{z}^0} n_t(z_t^0, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^l}^{\bar{z}^0} n_t(z_t^0, A_t^*, \eta_t^l; \cdot) f(q) dq + \\
& + \theta L_t^1 \int_{\hat{z}_t^h}^{\hat{z}_t^1} n_t(z_t^1, A_t^*, \eta_t^h; \cdot) f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^l}^{\hat{z}_t^1} n_t(z_t^1, A_t^*, \eta_t^l; \cdot) f(q) dq \}.
\end{aligned}$$

Aggregate moving costs:

$$\begin{aligned}
\Xi_t = & \eta_t^h \theta [L_t^0 \int_{\bar{z}_t^h}^{\bar{z}^0} f(q) dq + L_t^1 \int_{\bar{z}_t^h}^{\bar{z}_t^1} f(q) dq] + \eta_t^l (1 - \theta) [L_t^0 \int_{\bar{z}_t^l}^{\bar{z}^0} f(q) dq + L_t^1 \int_{\bar{z}_t^l}^{\bar{z}_t^1} f(q) dq] + \\
& + \eta_t^{*,h} \theta [L_t^{*,0} (\int_{\bar{q}_t^h}^{\hat{z}_t^{*,0,h}} f(q) dq + \int_{\bar{z}_t^{*,h}}^{\bar{z}^0} f(q) dq) + L_t^{*,1} (\int_{\bar{q}_t^h}^{\hat{z}_t^{*,1,h}} f(q) dq + \int_{\bar{z}_t^{*,h}}^{\bar{z}_t^1} f(q) dq)] + \\
& + \eta_t^{*,l} (1 - \theta) [L_t^{*,0} (\int_{\bar{q}_t^l}^{\hat{z}_t^{*,0,l}} f(q) dq + \int_{\bar{z}_t^{*,l}}^{\bar{z}^0} f(q) dq) + L_t^{*,1} (\int_{\bar{q}_t^l}^{\hat{z}_t^{*,1,l}} f(q) dq + \int_{\bar{z}_t^{*,l}}^{\bar{z}_t^1} f(q) dq)].
\end{aligned}$$

Law of motion for the mass of entrepreneurs in West Germany:

$$\begin{aligned}
L_{t+1}^1 = & \theta L_t^0 \int_{\hat{z}_t^{0,h}}^{\bar{z}_t^h} f(q) dq + (1 - \theta) L_t^0 \int_{\hat{z}_t^{0,l}}^{\bar{z}_t^l} f(q) dq + \theta L_t^1 \int_{\hat{z}_t^{1,h}}^{\bar{z}_t^h} f(q) dq + (1 - \theta) L_t^1 \int_{\hat{z}_t^{1,l}}^{\bar{z}_t^l} f(q) dq + \\
& + \theta L_t^{*,0} \int_{\bar{z}_t^{*,h}}^{\bar{z}^0} f(q) dq + (1 - \theta) L_t^{*,0} \int_{\bar{z}_t^{*,l}}^{\bar{z}^0} f(q) dq + \theta L_t^{*,1} \int_{\bar{z}_t^{*,h}}^{\bar{z}_t^1} f(q) dq + (1 - \theta) L_t^{*,1} \int_{\bar{z}_t^{*,l}}^{\bar{z}_t^1} f(q) dq.
\end{aligned}$$

Law of motion for the mass of entrepreneurs in East Germany:

$$\begin{aligned}
L_{t+1}^{*,1} = & \theta L_t^{*,0} \int_{\hat{z}_t^{*,0,h}}^{\bar{z}_t^{*,h}} f(q) dq + (1 - \theta) L_t^{*,0} \int_{\hat{z}_t^{*,0,l}}^{\bar{z}_t^{*,l}} f(q) dq + \theta L_t^{*,1} \int_{\hat{z}_t^{*,1,h}}^{\bar{z}_t^{*,h}} f(q) dq + \\
& + (1 - \theta) L_t^{*,1} \int_{\hat{z}_t^{*,1,l}}^{\bar{z}_t^{*,l}} f(q) dq + \theta L_t^0 \int_{\bar{z}_t^h}^{\bar{z}^0} f(q) dq + (1 - \theta) L_t^0 \int_{\bar{z}_t^l}^{\bar{z}^0} f(q) dq + \\
& + \theta L_t^1 \int_{\bar{z}_t^h}^{\bar{z}_t^1} f(q) dq + (1 - \theta) L_t^1 \int_{\bar{z}_t^l}^{\bar{z}_t^1} f(q) dq.
\end{aligned}$$

A.3 Proof of Lemma 4.1

The threshold of managerial ability that determines who is indifferent between setting up a business in East or West Germany only exists for West German individuals if $(1 - \lambda_t)^{(1-\nu)\gamma} (1 - \chi_t)^{\nu\gamma} < \frac{A_t^*}{A_t} 1^{-\gamma}$ and for East Germans this threshold only exists if $(1 - \lambda_t)^{(1-\nu)\gamma} (1 - \chi_t)^{\nu\gamma} > \frac{A_t^*}{A_t} 1^{-\gamma}$. These conditions are mutually exclusive.

A.4 Calibration after Reunification

Table A-4: Evolution of Discount on Rental Rate of Capital and Moving Costs

Period after Reunification	Discount on Rental Rate χ_t	Moving Costs to West German GDP per Capita of Previous Period $\eta_t^l \frac{Y_{t-1}^w}{P_{t-1}}$
1	0.35	0.5
2	0.54	0.33
3	0.57	0.21
4	0.79	0.14
5	0.79	0.09
6	0.9	0.06