Exchange Rate Regimes and Labor Mobility: The Key Role of International Migration in the Adjustment Process of the Classical Gold Standard

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Abstract

The pre-1914 world was characterized by the existence of the gold standard and, concurrently, by an exceptional mass migration phenomenon. But, was there a relationship between the stability of the monetary system and the considerable wave of international migration? This paper, based on the theory of optimum currency areas, tries to answer this question by showing that labor flows constituted an essential adjustment mechanism for countries that opted for pegging their currency to gold. Indeed, the choice of the external stability implied not only the loss of the exchange rate instrument, but also of the autonomy in terms of monetary policy. Therefore other adjustment instruments were necessary, and it is likely that labor mobility played a central role in this process. Thus, econometric tests for the period 1881-1913 show that there was a strong link between the prevailing exchange rate regime and labor movements: while significant variations in the emigration rate fostered the adjustment of trade balance in the countries that belonged to the gold standard, the countries with flexible exchange rates experienced a lower correlation between labor mobility and trade balance. For them, exchange rates constituted the main adjustment mechanism.

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> *"It will be granted that the hope of economic betterment is not the sole motive for emigration. Religious or political persecution, racial discrimination, or the mere love of adventure may be the impelling force. But, in the main, the emigrant is a seller of labor, seeking the best price for his services, and hence not apt to be attracted by a stagnant market".*
>
> Harry Jerome (1926)

The pre-1914 world was characterized by the stability of the most important currencies of the planet and, at the same time, by very high levels of labor mobility on the international scale. Thus, during the 1870s and 1880s, the gold standard became the reference monetary system, not only for the "core" nations, which guaranteed the convertibility of their currency into gold and then its stability, but also for the "peripheral" countries, concerned about maintaining some level of credibility by setting limits to their exchange rate fluctuations. The mass migration phenomenon that occurred during the second half of the nineteenth and the beginning of the twentieth centuries represents, as for it, a unique process in the history of humanity: there were virtually no border controls and the labor needs of the "New World" were overwhelming. Then, is it possible to deduce that there was a relationship between the stability of the classical gold standard and the significant wave of migration flows that marked this period?

Actually, the *laissez-faire* that prevailed in terms of migration policies before World War I did not only bring about a high volume of international flows, but was also accompanied by strong variations in these flows. The American immigration rate, for instance, went up from 2.9‰ in 1878 to 14.9‰ in 1882, and then came back down to 5.8‰ in 1886. But, beyond the frequency and the extent of cycle reversals, what is really striking is the link between migration fluctuations and business cycles. After a negative shock at home, the number of emigrants tended to increase, above all when the economic activity in receiving countries was booming; on the contrary, expansions in sending countries entailed a slowdown in labor outflows, while depressions in host countries resulted in return movements to the home country.

Therefore, labor mobility represented a safety valve for European workers, who did not benefit from unemployment insurance. It is also possible to think that it constituted an adjustment mechanism for the countries that belonged to the gold standard. Indeed, the choice of currency stability implied not only the loss of the exchange rate instrument, but also of the autonomy in terms of monetary policy. Therefore, other adjustment instruments were necessary, and it is likely that labor mobility played a central role in this process. In that sense, Eichengreen (1996) points out that: *"The other channel for labor market adjustment under the gold standard was international migration [...]. When conditions worsened in Europe, workers migrated to North America, South America, Australia and*

New Zealand, reducing domestic labor supply and unemployment." (Eichengreen, 1996: 368). In the same way, Panic (1992) believes that one of the *"secrets of the gold standard's durability and success"* lies on international labor flows: *"Large-scale international labour mobility was another important factor in sustaining the gold standard arrangements [...]. Finally, diversity of capital and labour movements is as essential as flexibility in monetary and other arrangements if a monetary system is to operate successfully."* (Panic, 1992: 102, 109).

Such an argument is in line with the optimum currency areas theory, according to which being part of a fixed exchange rate regime implies the existence of adjustment mechanisms, among them labor movements, that offset the exchange rate rigidity (Mundell, 1961). Many empirical studies have been conducted in this perspective in order to show the importance of interregional mobility in the United States on the one hand, and to stress its lowness in Europe on the other hand. But research works on labor mobility as an adjustment mechanism during the gold standard are very uncommon. Most of the existing studies put the emphasis on the structural determinants of international migration. Some authors have looked into the cyclical economic causes of migration fluctuations (*inter alia*, Jerome, 1926; Thomas, 1954; Gould, 1979; Hatton and Williamson, 1998), but there are no real studies on the relationship between gold standard and migration cycles. Therefore, the aim of this paper is to evaluate to what extent pre-1914 migration movements, as suggested by the optimum currency areas theory, played a role as an adjustment mechanism for the countries that opted for a fixed exchange rate strategy.

The remainder of the paper is organized as follows. Section I presents an economic literature survey of the role of labor mobility in the adjustment process of fixed exchange rate regimes. Section II develops a model of balance-of-payments adjustment with labor mobility, the purpose being to introduce international migration as a determining factor of the changes in the current account balance. Section III shows that there were alternate adjustment mechanisms during the gold standard period, but the existence of a number of constraints made labor mobility essential for most of the countries that chose to peg their currency to gold. Section IV describes the international migration phenomenon before World War I, focusing on the cyclical components of labor flows. It specially emphasizes the way labor mobility could lead to the current account equilibrium. Finally, Section V provides econometric evidence on the trade-off between labor mobility and exchange rate fluctuations according to the exchange rate regime adopted by each country.

I – Labor Mobility and Adjustment in the Economic Literature

How a country that runs a current account deficit can return to the equilibrium position? If the exchange rate of this country is flexible, the return to the equilibrium should be based on exchange rate fluctuations: capital outflows induced by the deficit bring about a rise in the exchange rate (depreciation) that implies an increase in national competitiveness. On the contrary, if the country chose to stabilize its exchange rate, as it was the case for many European nations before Word War I,

the adjustment is trickier. The optimum currency area theory shows that international migration can play a crucial role in this adjustment process.

Labor mobility in the optimum currency areas theory

At the origin of the economic research on optimum currency areas, Mundell (1961) established that the participation in a monetary union implies the existence of adjustment mechanisms that work towards offsetting, in the event of an asymmetric shock, exchange rate rigidity. His analysis assumes that wages are sticky downwards, which implies that prices cannot help to restore the current account equilibrium. Therefore, the adjustment burden has to be transferred to other mechanisms, in particular factor mobility. By moving from one region to another, labor and capital contribute to solve adjustment problems related to exchange rate stability: *"If the world can be divided into regions within each of which there is factor mobility and between which there is factor immobility, then each of these regions should have a separate currency which fluctuates relative to all other currencies. [...] But a region is an economic unit while a currency domain is partly an expression of national sovereignty. [...] The validity of the argument for flexible exchange rates therefore hinges on the closeness with which nations correspond to regions. If labor and capital are insufficiently mobile within a country then flexibility of the external price of the national currency cannot be expected to perform the stabilization function attributed to it, and one could expect varying rates of unemployment or inflation in the different regions.* (Mundell, 1961: 663-664).

Therefore, Mundell considers that the world should be divided into several monetary unions characterized by a high internal level of factor mobility and that the adoption of flexible exchange rates would allow to compensate for the lack of mobility between these different currency areas. In a sense, he prolongs the argument of Meade (1957) according to whom, due to the lack of mobility of western European workers, a floating exchange rate regime would be preferable in order to simultaneously reach internal stability and current account equilibrium: *"Why it is that the adjustment of payments between England and Wales is so much easier than that Germany and France? [...] In the first place, the fact that goods, labour and capital can move freely between England and Wales makes adjustment easier. Suppose Wales is in economic difficulty. A deflation of prices and incomes in Wales relatively to prices and incomes in England will have more effects in inducing consumers to buy Welsh rather than English products and in inducing workers to work in England rather than Wales, because there are no restriction on the movements of goods or workers from Wales to England."* (Meade, 1957: 385-386).

McKinnon (1963) tries to go more deeply into the question by making a distinction between geographic mobility on the one hand, and industrial mobility on the other hand. In particular, he considers the possibility, in the event of an asymmetric shock, of developing new activities in regions in difficulties, so that factors would not have to move from a region to another. Industrial mobility hence represents an alternative to geographic mobility. But McKinnon himself acknowledges the

limits of such an optimality criterion for currency areas: *"Once we consider problems of factor immobility among industries, it may not be feasible to consider slicing the world into currency areas along industrial groupings rather than geographical groupings."* (McKinnon, 1963: 19). As a matter of fact, the optimum currency areas theory has focused on geographic mobility, even though considerations on industrial mobility should not be excluded. Thus, Kenen (1969) underlines the difficulties of shifting from an industry to another when factors flow from a region in economic crisis to a growing region. He concludes that economic diversification constitutes a prerequisite for monetary integration: factor mobility becomes easier and the reaction capacity of economies faced with asymmetric shocks increases.

Criticisms against the role of labor mobility as an adjustment mechanism

The existence of restrictive migration policies probably represents one of the main obstacles to labor mobility. Yet, even when labor movements are free, international labor flows remain relatively limited. In that sense, Corden (1973) cannot figure out how people could massively move to other countries when intra-national mobility is itself highly limited: *"Can it really be imagined that a U.K. depressed-area problem could be solved by the large-scale migration of British workers to Germany? It is conceivable; but when Britons are reluctant even to move from Scotland or Tyneside to the south, though the language is almost the same, it takes some imagination to conceive of labor mobility solving the central problem of monetary integration."* Corden (1973: 167-68).

Generally speaking, emigration constitutes a last resort solution. Thus, Dunn (1971) brings up the existence of significant "psychic" costs in the decision to migrate related to the implications in terms of adaptation to a new environment, a new culture, and even a new language. In the same perspective, Bertola (1989) develops a model of labor mobility, whose microeconomic foundations emphasize the importance of the degree of uncertainty that candidates for migration have to cope with when they make their decision: *"The higher is the uncertainty about future earnings in different locations or sectors (i.e. the more likely are further changes of the differential in either direction), the more reluctant an individual should be to move – both because she is aware that migrating back will be costly if the wage differential changes sign, and because even larger earnings differentials will induce migration by others, reducing (through externalities) the income available to her in the new location."* (Bertola, 1989: 107).

On top of this problem of uncertainty is the question to know what happens when economic conditions worsen in the host country. Should all the migrants go back to their country or move to a region that shows signs of prosperity? In other words, the hypothesis that affected workers should migrate every time economics conditions change seems very unlikely. Furthermore, what mainly determines mobility is the existence of a wage gap between sending and receiving countries. But if the country that copes with a shock is the one with the higher wage level, will its inhabitants be disposed to move to other regions within the currency area? Nothing is less sure. It might be preferable to wait

for economic recovery rather than to have to go and work in a country where wage conditions are not as good as in the home country.

In other respects, the role of labor mobility as an adjustment mechanism can be questioned by the existence of obstacles to industrial mobility (Lanyi, 1969). For instance, trade unions can impose entry barriers in some areas of activity. Unskilled workers may also prefer to wait that the situation gets better in their origin industry rather than to have to retrain for a new occupation. Even though there are suitable formations, it is possible that the unemployed do not have access to them because of information deficiencies. Consequently, it seems very unlikely that unemployed people succeed in finding a job in another region, insofar as it also means a change of occupation. And even when they stay in the same industry, differences in labor productivity related with used technologies could bridle the employability of the candidates for emigration. In the same way, differences in the capital-labor ratio between regions could lessen the impact of factor mobility in terms of adjustment: *"If, for example, the expanding industries in B are capital intensive, and the declining industries in A are labour intensive, the net result may be a continuance of labour employment in A, and capital shortage in B."* (Presley and Dennis, 1976: 13).

Finally, the countercyclical action of labor mobility has been questioned by the so called "maladjustment theory". Cassel (1923), for instance, points out that migration movements never synchronize exactly with changes in economic conditions: when the newcomers, who were attracted by the expansion of rural or industrial activity, arrive in their host country, they might have to deal with an economic turnaround, which would let them no other option but to swell the ranks of the unemployed. Moreover, as underlined by Erkel-Rousse (1997), migration affects not only the labor market, but also the output market. An increase in emigration comes with a fall in domestic consumption and hence in the labor demand of the sending region. Similarly, immigrants contribute to increasing the demand in goods and services in the receiving region, as well as the labor demand from the firms subject to the additional demand. International migration, in lieu of solving the adjustment problems, might therefore play a pro-cyclical role.

Efficiency conditions of labor mobility

Ishiyama (1975), in his literature review of optimum currency areas, takes a pessimistic view at the role of labor mobility as an adjustment mechanism: *"Thus, it seems plain, without a lengthy discussion, that labour mobility is an inadequate substitute for more conventional payments adjustment instruments – demand management and exchange rate variation."* (Ishiyama, 1975: 349). It is quite true that there are a number of obstacles that reduce the relevance of arguments for labor mobility as an optimality criterion for currency areas. Nevertheless, international migration can conditionally meet the adjustment needs of the economies that decide to peg their currency.

First of all, the adjustment by way of labor mobility assumes that there are no institutional barriers to workers' movements. As a matter of fact, the existence of restrictive migration policies

between member countries tends to increase integration costs. On that score, the pre-1914 world is a good example of free movement of workers, since passports and visas were not required to cross borders. Yet, this condition alone is not enough if we refer to the case of the European Union, where citizens' movements are totally free, but labor mobility is quite limited. On the other hand, illegal immigration can offset the effects of border controls. Thus, despite all their efforts to restrict the number of immigrants to the United States or Europe, American and European authorities have not been able to prevent clandestine border crossings. Therefore, labor mobility continues to represent a safety valve for sending countries, in spite of restrictive immigration policies.

Then, geographic proximity constitutes a significant determinant for the success of the adjustment process. If the distance is too long, the lag between the beginning of the cycle reversal and the arrival of migrants on foreign labor markets might increase. In that sense, technical improvements in terms of transport, as well as the reduction of the costs, contribute to spurring labor mobility and decreasing potential procyclical effects of international migration. The efficiency of information channels is also important. Candidates for emigration need to know the labor market conditions in the country where they intend to go. In that way, the fact to have close relatives or friends abroad works in favor of international mobility. Labor flows may also be encouraged by the implementation of an interregional job search institution aiming to further a better match between labor supply and demand and to reduce the impact of economic shocks.

As shown previously, one of many obstacles to labor mobility is attributable to industrial mobility problems. International migration is therefore facilitated when technical conditions are similar in sending and receiving countries. The host country will indeed absorb more smoothly the foreign labor force if domestic firms require unskilled workers. Nevertheless, if skilled labor force needs are important, it is still possible to invest in formation. In that sense, involved countries have the option to cooperate so that potential migrants may come up to employers' expectations.

As for the wage gap between regions, there are two possibilities: either the wage differential is significant and there is a chance that the adjustment could be asymmetric (only the workers from low income countries are interested in moving), or there is no differential and the incentive to move is low. In that sense, the mass migration phenomenon that occurred before World War I shows that the existence of a significant wage gap between Europe and the "New World" led European workers to look for job opportunities in the latter. Nevertheless, return ratios were high (around 30% for the United States and almost 50% for Argentina during the period 1890-1914), which confirms that the adjustment took place in both directions, and that the wage gap issue is probably not so important when labor mobility represents an answer to an economic shock.

In that respect, it is likely that the lack of social protection mechanisms, particularly unemployment benefits, represents an additional incentive to emigrate, which explains the differences in migration patterns between developing and industrialized countries. For instance, the low level of intra-European labor mobility is probably due to the existence of efficient Welfare States in most of

the member countries of the European Union, whereas the inhabitants of many African, Asian or Latin American countries lack the support of the State in terms of social benefits.

II – A Model of Current Account Adjustment with Labor Mobility

From the very first sentence of his article *"A Theory of Optimum Currency Areas"*, Mundell (1961) focuses on the problem of current account adjustment: *"It is patently obvious that periodic balance-of-payments crises will remain an integral feature of the international economic system as long as fixed exchange rates and rigid wage and price levels prevent the terms of trade from fulfilling a natural role in the adjustment process"* (Mundell, 1961: 657). Yet, the reasons why labor mobility fosters current account adjustment in the case of fixed exchange rates are not clearly explained. The emphasis is put on the internal equilibrium, that is, on the reduction of unemployment in regions in recession and the fight against inflation in those in expansion, while the external equilibrium is completely forgotten. In the same way, though most of the studies on the feasibility of currency unions include labor mobility as an optimality criterion, they generally do not take into account the question of the current account adjustment. Thus, Bayoumi (1994), who devotes a substantial part of his model of optimum currency areas to labor mobility, does not dwell on external equilibrium. According to him, the main benefits acquired from migration indeed result from a better factor allocation, which brings about an increase in production inside the currency union.

If the external equilibrium issue is not necessarily significant for currency areas, it is, on the contrary, crucial in the case of the economies that are bound by fixed exchange rates. Actually, the exchange rate stability depends on capital flows, which are on their turn affected by current account movements. The stability of fixed exchange rate regimes is determined by the external equilibrium, and it is hence essential to understand how labor mobility can help to favor such equilibrium.

The model specifications

The purpose of the following analysis is to provide a better understanding of the different adjustment mechanisms that contribute to the current account equilibrium. The balance of payments is indeed affected by a series of factors that operate either in a complementary or a substitute way. The partial equilibrium equation that arises from the analysis allows to identify the alternative forces involved in the adjustment process and it notably shows the role played by labor mobility in this process.

Consider two regions i and j. Each of them is specialized in the production of only one good, which implies that there is no specific shock inside regions. Nominal wages are supposed to be rigid downwards. No particular role is assigned to financial integration or economic policy. The production function for region i is given by:

$$Y_t^i = \alpha L_t^i \qquad\qquad [1]$$

where Y_t^i is the output of the good produced in region i at period t, L_t^i corresponds to labor input, and α is a parameter below 1 that measures labor productivity. In the short run, the output market is in equilibrium when the production is equal to aggregate demand.

Total labor force in region i $\left(Z_t^i\right)$ consists, on the one hand, of labor input $\left(L_t^i\right)$ and, on the other hand, of the unemployed $\left(U_t^i\right)$:

$$Z_t^i = L_t^i + U_t^i \qquad [2]$$

The presence of unemployment is justified by downward nominal wage rigidities: while an increase in labor demand entails a rise in nominal wages, which allows to restore the equilibrium between labor supply and demand, a decrease in labor demand comes up against the wage freeze, which results in a disequilibrium between labor supply and demand, hence in unemployment.

Net emigration (N_t^i) is defined by:

$$N_t^i = E_t^i - I_t^i \qquad [3]$$

where E_t^i corresponds to gross emigration and I_t^i to gross immigration.

Total labor force in period $t+1$ is given by:

$$Z_{t+1}^i = Z_t^i - N_t^i \qquad [4]$$

$$\Leftrightarrow \qquad dZ_t^i = -N_t^i \qquad [5]$$

Therefore, the evolution of total labor force is determined by changes in net emigration.

Real exchange rate (ε_t) is written:

$$\varepsilon_t = \frac{e_t \cdot P_t^j}{P_t^i} \qquad [6]$$

where e_t is the nominal exchange rate between i and j (an increase in e_t implies a depreciation of the currency of i in comparison with the currency of j). P_t^i and P_t^j represent, respectively, the price levels in regions i and j.

Finally, the current account $\left(B_t^i\right)$ is given by:

$$B_t^i = \left(X_t^i - M_t^i\right) - T_t^i \qquad [7]$$

where $X_t^i - M_t^i$ is the trade balance and T_t^i represents transfers both private (in particular immigrants' remittances) and public (notably development aid).

The level of exports in the region i $\left(X_t^i\right)$ depends on the demand in the region j $\left(Y_t^j\right)$, as well as on the real exchange rate $\left(\varepsilon_t\right)$:

$$X_t^i = x_o^i + x_1^i \cdot Y_t^j + x_2^i \cdot \varepsilon_t \qquad [8]$$

A rise in foreign demand or in real exchange rate is accompanied by an increase in exports.

Imports in the region i $\left(M_t^i\right)$, as for them, are a function of the domestic demand $\left(Y_t^i\right)$, the real exchange rate $\left(\varepsilon_t\right)$, and the level of customs protection $\left(Q_t^i\right)$:

$$M_t^i = m_0^i + m_1^i \cdot Y_t^i - m_2^i \cdot \varepsilon_t - m_3^i \cdot Q_t^i \qquad [9]$$

An increase in the domestic demand implies a rise in imports, while an increase in the real exchange rate or the level of customs protection results in their fall.

Then it is possible to rewrite equation 9 as follows:

$$B_t^i = x_o^i + x_1^i \cdot Y_t^j + x_2^i \cdot \varepsilon_t - m_o^i - m_1^i \cdot Y_t^i + m_2^i \cdot \varepsilon_t + m_3^i \cdot Q_t^i - T_t^i \qquad [10]$$

The current account balance improves when foreign demand augments (rise in exports), domestic demand slow downs (drop in imports), real exchange rate increases (more exports and less imports), customs protection grows (less imports), and transfer outflows reduce.

Current account adjustment

The current account was defined in equation 10. A change in current account (dB_t^i) is written:

$$
\begin{aligned}
dB_t^i &= dx_o^i + x_1^i \cdot dY_t^j + x_2^i \cdot d\varepsilon_t - dm_o^i - m_1^i \cdot dY_t^i + m_2^i \cdot d\varepsilon_t + m_3^i \cdot dQ_t^i - dT_t^i \\
&= d\left(x_o^i - m_0^i\right) + x_1^i \cdot dY_t^j - m_1^i \cdot dY_t^i + \left(x_2^i + m_2^i\right)d\varepsilon_t + m_3^i \cdot dQ_t^i - dT_t^i \qquad [11]
\end{aligned}
$$

Knowing that $Y_t^i = \alpha L_t^i$ (equation 1), $L_t^i = Z_t^i - U_t^i$ (equation 2), and $dZ_t^i = -N_t^i$ (equation 5), then:

$$dY_t^i = -\alpha\left(N_t^i + dU_t^i\right) \qquad [12]$$

and:

$$dB_t^i = d\left(x_o^i - m_0^i\right) + x_1^i \cdot dY_t^j + m_1^i \cdot \alpha\left(N_t^i + dU_t^i\right) + \left(x_2^i + m_2^i\right)d\varepsilon_t + m_3^i \cdot Q_t^i - dT_t^i \qquad [13]$$

In total, changes in current account balance $\left(dB_t^i\right)$ depend on autonomous changes in domestic $\left(dx_o^i\right)$ and foreign $\left(dm_o^i\right)$ goods demand, on changes in foreign demand $\left(dY_t^j\right)$, on net emigration $\left(N_t^i\right)$, on changes in unemployment $\left(dU_t^i\right)$, in real exchange rate $\left(d\varepsilon_t\right)$, in customs protection $\left(dQ_t^i\right)$, and finally in transfers $\left(dT_t^i\right)$.

Labor mobility plays a double role in the current account adjustment process. First, workers movements from region i to region j entail a decrease in total labor force, which results in a drop in production (equation 1 determines that the output is a function of labor input). Since, in the short term, the production function is equal to the aggregate demand function, an increase in net emigration brings about a drop in aggregate demand, hence in imports from j. On the contrary, the arrival of new workers in region j generates a rise in demand and, then, in exports in region i. The result is an improvement in the trade balance of region i and a deterioration of the j one. The second role of labor mobility is connected to the remittances that migrants send to their family. Given that they belong to the current account, remittances from j to i also contribute to restoring the equilibrium between both regions.

III – Alternative Mechanisms and Adjustment Constraints during the Gold Standard

The good functioning of the classical gold standard (1870-1914) implied that monetary authorities focus on the external stability of their currency as the central goal of economic policy. Yet, the loss of monetary policy autonomy that came with the currency peg was a cause of concern for public authorities. In order to get some leeway, many gold standard countries did not fully respect the "rules of the game" of the system. The upshot was that the Hume's price-specie-flow mechanism could not operate in a proper way and could not therefore ensure the current account automatic adjustment (Bloomfield, 1959). Then, the stability of the gold standard could only arise from the economies' capacity and speed of adjustment (Bayoumi and Eichengren, 1994).

Asymmetric shocks or cycle synchronization?

In keeping with the lessons of the Heckscher-Ohlin model, the nineteenth century trade liberalization process gave rise to a high degree of specialization: the so-called "international division of labor". Nevertheless, such a polarization of activities apparently did not lead to a significant increase in asymmetric shocks within the gold standard area. It seems that monetary coordination contributed to partly reducing the impact of specialization, bringing about a lower level of cycle asymmetry (Flandreau and Maurel, 2001). In that sense, Morgenstern (1959) notices that European economic cycles were highly synchronized before World War I. Likewise, Huffman and Lothian (1984) show that one of the implications for the United Kingdom and the United States of taking part in the gold standard system was a higher cycle transmission between their economies. García-Iglesias

(2002), as for her, underlines the difference between Scandinavian countries, which belonged to the gold standard, and southern European countries (Italy, Portugal and Spain), whose participation to the gold standard was erratic. In the former case, there was a significant correlation between variations in domestic real GDP and prices, and variations in the United Kingdom and the United States; in the latter case, economic activity was relatively insulated from American and British cycles.

The higher degree of symmetry that came with the gold standard constituted a key factor for the stability of the system. But, this does not mean that specific shocks could not occur. Thus, Blanchard and Quah (1989) emphasize the existence of inherent economic disturbances related to the diversity of domestic productions. Furthermore, real outputs showed more fluctuations during the gold standard period than after World War II: *"The average supply shock was roughly three times as large under the classical gold standard as under Bretton Woods and the post-Bretton Woods float. Demand shocks, meanwhile, appear to have been about twice as large under the classical gold standard."* (Bayoumi and Eichengreen, 1994: 290). Besides, the role of the State in terms of counter-cyclical intervention was strongly limited during the gold standard period. As underlined by Bordo and Schwartz (1996), the adherence to the convertibility rule of the gold standard found expression in the implementation of "prudent and stable" economic policies: on the one hand, the gold standard choice meant that public authorities could make use of the monetary instrument with the only purpose to stabilize the exchange rate; on the other hand, fiscal policy was confined to maintain the public budget equilibrium. Therefore, the response to economic disturbances could not lean on significant money supply or public spending variations. Other adjustment mechanisms were necessary to offset the loss of the exchange rate instrument.

Wage rigidities

The theory of optimum currency areas insists on the need to strengthen wage flexibility within currency unions. The double loss in terms of monetary policy autonomy and the exchange rate as an adjustment mechanism indeed constitutes a strong constraint in case of asymmetric shocks. But the existence of wage rigidities did not help gold standard countries to achieve an optimal adjustment.

Even though some recent works show that wage flexibility was higher before World War I than today, at least in the United States (Hanes and James, 2003), most of the studies confirm the existence of a "ratchet effect" related to the wage-setting process: *"Downward wage adjustment rarely reached any sizable amplitude, even in the nineteenth century, among the countries which maintained exchange-rate stability, and it may be doubted whether they would have proved much more acceptable at that time, economically, politically, and socially, than they are today"* (Triffin, 1964: 4). Although it seems true that depression periods could cause wage cuts, these were marginal and in any case comparable to the upward adjustments that followed a strong economic growth (Phelps and Browne, 1968). A business boom was indeed accompanied by a tough competition between firms in order to attract new workers: *"When trade is good, the force of competition among the employers themselves,*

each desiring to extend his business, and to get for himself as much as possible of this high return, makes then consent to pay higher wages to their employees in order to obtain their services" (Marshall, 1920: 574). This situation implied wage increases, whereas downward pressures had to face up to the resistance of workers and union representatives.

In that perspective, Allen (1992) maintains that wages were less flexible during the nineteenth century than at the end of the twentieth, which is confirmed by Hatton (1988), for the British economy, and Gordon (1990) or Hanes (1993), for the American economy. The latter points out that after the 1880s strike wave in the United States, firms were reluctant to reduce nominal wages. Beyond the fear of avoiding industrial disputes, Gould (1979) insists on the fact that American firms were sensitive to the advantages of keeping the more experienced workers by way of real wage stability, even when they had to cope with an economic turnaround. Besides, as suggested by Bewley (1999), it is possible that employers themselves considered that it was not "morally" desirable to cut wages. Finally, the surge of criticisms against the liberal system, accused of impoverishing the working classes, brought about a rise in workers' struggles that led States, in particular in Europe, to intervene in the economic environment by implementing social welfare instruments. As a consequence, business fluctuations tended to have an inflationary effect on wages, which lowered the adjustment possibilities.

Capital and labor mobility: substitute or complement?

An alternative to real exchange rate flexibility is based on capital mobility. The gold standard period was precisely characterized by a high degree of financial market openness (Bayoumi, 1990; Flandreau and Rivière, 1999). Bloomfield (1968) shows that short-term capital flows significantly increased as the gold standard developed and consolidated its position. A higher volatility was also part of the process. Triffin (1964) and Kindleberger (1985) notice that the annual volume of international investment before 1914 was closely linked to economic cycles, both in sending and receiving countries: during growth periods, capital outflows increased, while recessions were accompanied by higher capital entries. Moreover, it was quite common that a nation rapidly switched from a net credit balance to a debit balance, and vice versa, confirming the role of capital mobility in the short-term adjustment.

But all the countries did not have equal access to international financing. The "core" countries of the gold standard, and above all the United Kingdom, Germany, France and the United States, benefited from a competitive advantage in terms of short-term capital attraction, which enabled them to reduce the adjustment cost (Gallarotti, 1995). The "periphery" countries, characterized by high levels of external debt and whose financial markets were not considered by investors as mature enough (Bordo and Flandreau, 2001), did not dispose of the same financing capacity. Labor mobility hence took an important place in the adjustment process. In that sense, it is likely that there was some degree of substitution between capital and labor mobility. The countries that could enjoy the financial

markets' confidence were able to finance their current account deficits at a lower cost, and labor mobility was limited. On the contrary, in the countries considered as unsafe by international investors, emigration contributed to tackling deficits and unemployment problems (Panic, 1992).

In contrast, Williamson (1996) considers that capital chased expatriated workers. Actually, emigration implies changes in the capital-labor ratio: whereas capital intensity increases in the sending country, it declines in the receiving one. The marginal product of capital grows in the latter, bringing about a shift in capital flows. This mechanism helps to understand why New World countries absorbed a significant part of the pre-1914 international investment (Bairoch, 1997). Besides, the complementarity between capital and labor mobility could be explained by the fact that an increase in foreign investments contributed to develop employment opportunities in receiving countries, which furthered a new surge of immigrants.

Eventually, the substitute or complementary nature of capital and labor mobility depended on national situations: while the relation between capital account and emigration rate was positive in the United Kingdom during the period 1860-1913 (Figure 1), it was negative for Italy during the period 1862-1913 (Figure 2).
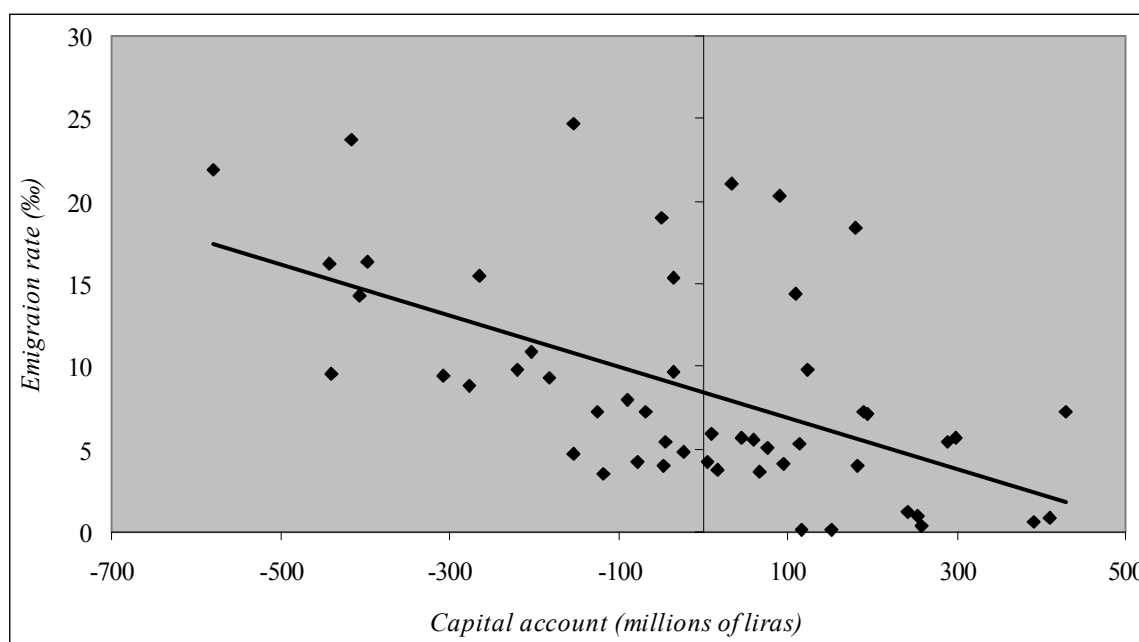
Figure 1
Capital account and emigration rate in the United Kingdom: 1860-1913
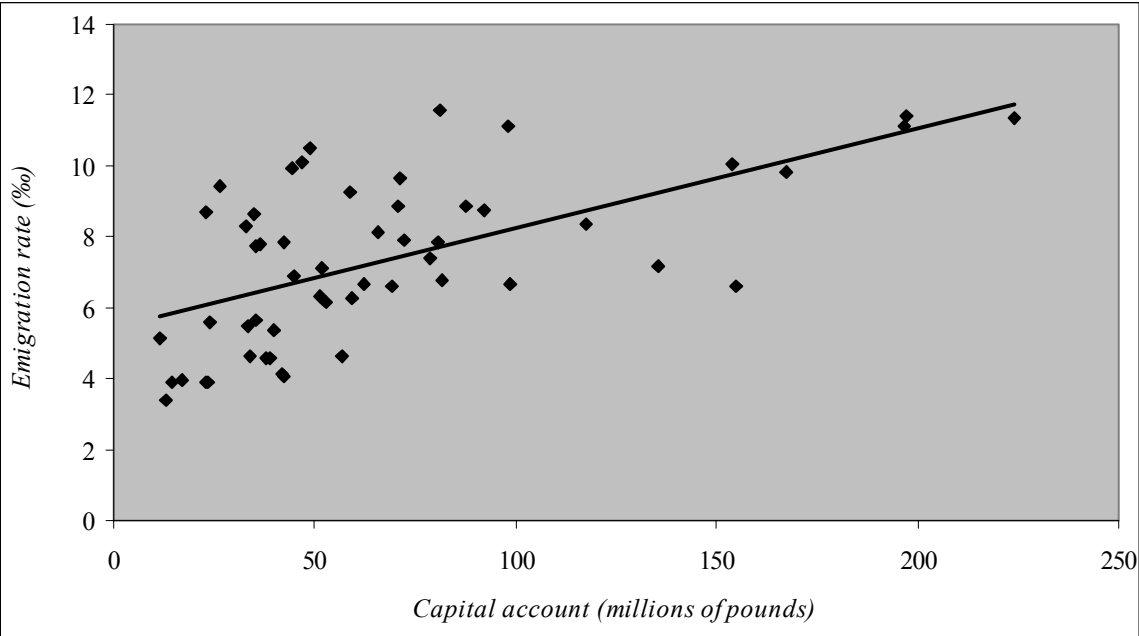
Note: Correlation coefficient = 0.60.
Sources: Emigration rate: author's calculations based on Ferenczi and Willcox (1929) and Maddison (2003); capital account: Mitchell (2003a).

Figure 2
Capital account and emigration rate in Italy: 1862-1913

Note: Correlation coefficient = -0.55.
Sources: Emigration rate: author's calculations based on Ferenczi and Willcox (1929) and Maddison (2003); capital account: Mitchell (2003a).

Trade policy and international migration

Does the implementation or withdrawal of trade barriers have repercussions in terms of migration flows? As usual, there are two conflicting positions in this debate. The first one, based on the Heckscher-Ohlin-Samuelson model, considers protectionism as one of the causes of international factor movements. Mundell (1957), for instance, maintains that: *"An increase in trade impediments stimulates factor movements and an increase in restrictions to factor movements stimulates trade."* (Mundell, 1957: 321). According to the classical theory of international trade, free trade can lead to the equalization of factor prices, making factor mobility useless. Then, the use of protectionist measures slows down the convergence process and brings about higher levels of factor mobility: labor moves from labor abundant countries to capital abundant countries, while capital travels in the opposite direction (Razin and Sadka, 1997).

The defenders of the other position believe that protectionism represents an alternative to factor mobility as an adjustment mechanism. Kindleberger (1951) notes that not all European countries reacted in the same way to the 1870s drop in wheat prices: while some of them, like France and Germany, chose to protect their agriculture, others, particularly Italy, used the "international solution", that is, emigration. In the same perspective, Sánchez-Alonso (1995) finds that Spanish protectionism, strengthened by the depreciation of the peseta, constitutes part of the explanation for the low levels of emigration experienced by Spain during the nineteenth century: *"Customs protection*

kept the people in the fields; without it, one can assume that rural population would have emigrated not to the cities, which had low attraction capacity, but abroad." (Sánchez-Alonso, 1995: 183).

A more general look at the period 1880-1913 shows that the behavior of most of the European countries was in accordance with this point of view. As shown by Table 1, correlation coefficients between protection rates and emigration rates were negative and significant in the case of Belgium, Germany, Italy, Switzerland and, to a lesser extent, the Netherlands, Spain and Portugal. They were positive and significant only for Austria-Hungary and Norway. As for other countries, the results do not allow to conclude.

Table 1
Correlation coefficients between tariffs and emigration rates: 1880-1913

Countries	Correlation coefficients
Switzerland	-0.83
Italy	-0.66
Belgium	-0.46
Germany	-0.45
Netherlands	-0.39
Portugal	-0.33
Spain	-0.30
United Kingdom	-0.21
France	-0.08
Russia	0.16
Denmark	0.18
Sweden	0.23
Norway	0.31
Hungary	0.32
Austria	0.37

Sources: Author's calculations based on Ferenczi and Willcox (1929) for emigration rates; Flandreau and Zumer (2004) for tariffs.

In total, nations that decided to join the gold standard "club" could theoretically rely on several adjustment mechanisms to cope with their current account disequilibria. First, they could strengthen the wage and price flexibility in order to improve their economic competitiveness. But most of the countries of the period were dealing with social movements that made difficult the implementation of such an option. Then, the high level of financial integration that characterized the gold standard period was supposed to favor the adjustment through capital mobility. Yet, the adjustment role of capital movements thoroughly hinged on the borrowing capacity of each country, which was essentially a function of the confidence level of international financial markets. In other

respects, it was possible to increase the level of trade protection in order to reduce deficits. But the pre-1914 word was rather a period of decreasing tariffs. Finally, labor mobility constituted a good adjustment mechanism for most of the gold standard members, above all provided that this period was distinguished by an outstanding mass migration phenomenon.

## IV – Labor Mobility, Business Cycles and International Adjustment during the Gold Standard Period

Hatton and Williamson (1998) emphasize that pre-World War I mass migration corresponded to a long-term movement: *"Variations in economic activity or employment were largely responsible for fluctuations around the long swing pattern, but they account for a relatively modest proportion of the overall variation in emigration rates."* (Hatton and Williamson, 1998: 74). Actually, the decision to migrate represented, first of all, a response to the desire to improve trying life conditions. However, business fluctuations constituted an additional incentive to move, above all for workers confronted with the unemployment problem. In that respect, most studies, following the findings of Jerome (1926), observe the cyclical nature of international migration: a period of economic growth in the host country, combined with a depression in emigration countries, brought about an increase in the pace of departures; conversely, a slowdown in the economic activity of immigration nations could restrain arrivals, especially when labor market conditions improved in the origin country.

International migration before World War I: an outstanding phenomenon

Globalization does not constitute a new phenomenon: the pre-1914 world was characterized by a high degree of trade openness, by significant levels of capital mobility, mainly between the gold standard members, and by massive migration flows from Europe to the "New World". There were indeed very few border controls, and the non-existence of passports and visas fostered labor mobility. Actually, the three or four decades that preceded World War I experienced much more human movements than today, as shown by Figure 3, which illustrates the course of an "international migration index" (IMI) between 1850 and 1999. The index is calculated as followed:

$$IMI = \frac{immigration + emigration}{population} \times 1000$$

Figure 3
International migration index: 1850-1999
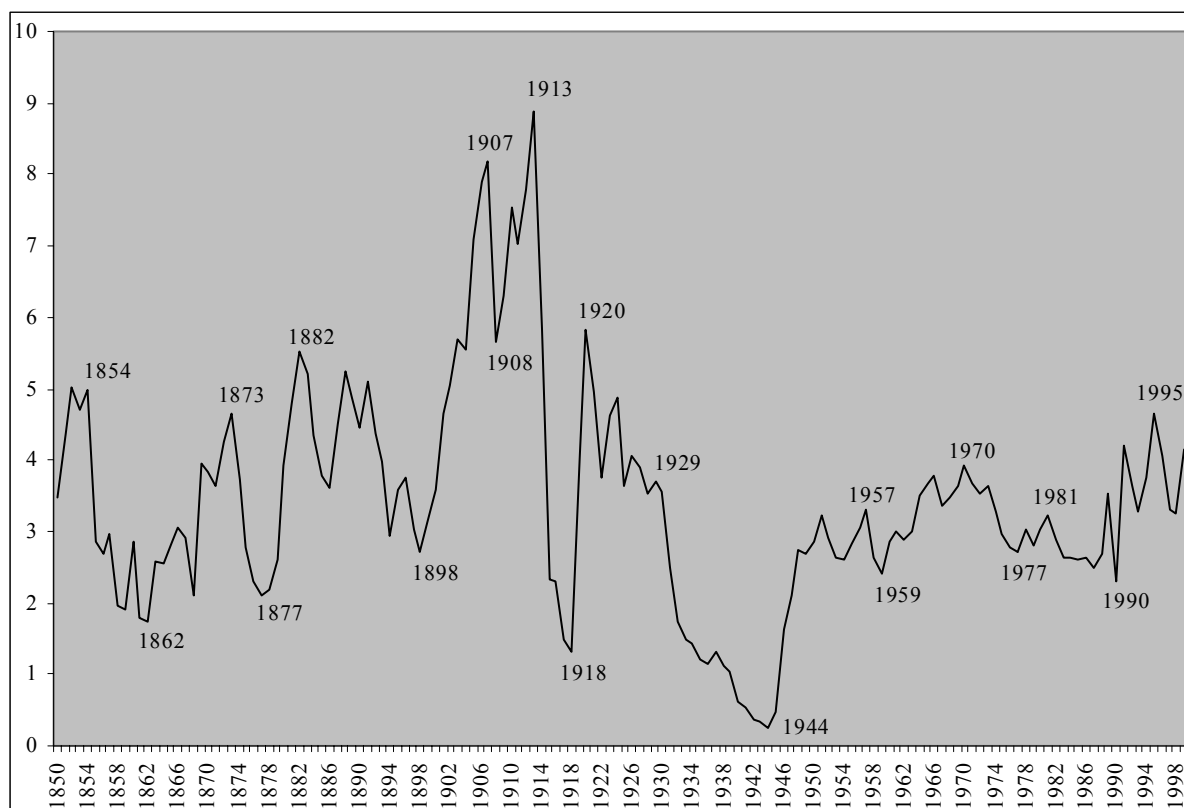
Notes: The IMI is the sum of the number of immigrants and emigrants in each country over the population of the country time 1000. It is composed of data from 37 countries: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Mexico, the Netherlands, Norway, New Zealand, Poland, Portugal, Romania, Russia, Serbia, South Africa, Spain, Sweden, Switzerland, the United Kingdom, the United States, Uruguay, Venezuela, Yugoslavia, and Zimbabwe.
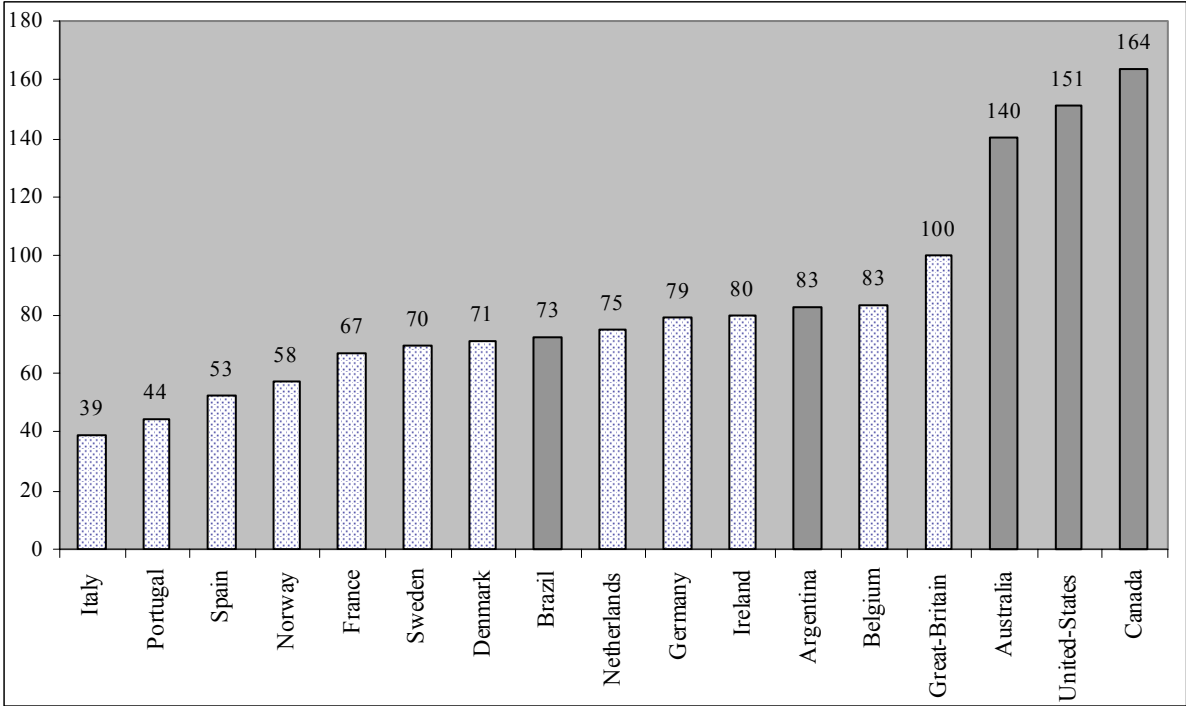*Sources:* Author's calculations based on Ferenczi and Willcox (1929) and Mitchell (2003a, 2003b and 2003c) for the number of migrants, and Maddison (2003) for population.

The immense majority of migrants before World War I chose the United States as their host country. Only between 1880 and 1914, over thirty-three million Europeans settled in American lands. After a first wave of migration from Britain Islands, predominantly Ireland, arrivals diversified: Germany and Scandinavia from the 1850s to the 1880s; eastern and southern Europe after 1880. Latin American countries, as for them, received about ten million migrants between 1870 and 1914, Brazil and Argentina being the two main receiving countries (7.5 millions). Canada, Australia, New Zealand, and South Africa came next in the preference order of the candidates for emigration, especially of the British.

It is likely that the development of the fallow lands of the Americas and Oceania would not have been possible without the contribution of immigrants; and towns, factories or railways would not have been built without all the foreigners attracted by the "American dream". Indeed, while the first stage of the Industrial Revolution was accompanied by a deterioration of the living conditions in

Europe: increase in the poverty and aggravation of social inequalities (Bairoch, 1997), the New World experienced high levels of agricultural and industrial development. The consequence was a divergence in growth rates between European nations and such countries as the United States, Australia or Canada. Whereas the average real GDP growth rate between 1870 and 1913 was superior or equal to 3.5% in the New World, European countries experienced growth rates between 1.6% for France and 2.8% for Germany. The upshot of these growth differences, associated with a labor shortage in the New World, was the existence of significant wage gaps (Figure 4), which strongly contributed to the decision to migrate. Australia, Canada and the United States, in particular, offered real wage levels widely over the European ones. Hence the attraction that represented these countries for migrants: the lower the level of domestic real wages, the higher the propensity to emigrate (Hatton and Williamson, 1998).

Figure 4
Real wages: 1870-1913

Note: Wages correspond to the average of international real wages (100 = average British wages).
Source: Author's calculations based on Williamson (1995).

The demographic growth, which entailed a population surplus in Europe, widely fostered the increase in migration movements, above all among young people who looked abroad for opportunities they did not have at home. Easterlin (1961) points out that there was a twenty-year lag between a demographic boom and the surge of migration flows, which is confirmed by later studies (Hatton and Williamson, 1994). On the contrary, the drop in northern European fertility partly explains the

emigration slowdown in the region from the end of the nineteenth century onwards: *"The 'Malthusian Devil' crossed the European continent from Ireland to Germany, then to Scandinavia and finally to Southern and Eastern countries where his sway was to be greatest of all"* (Thomas, 1954: 224). Besides, the industrialization degree of the economy and, consequently, the urbanization one, affected in a significant way migration flows. Indeed, urban workers seemed more sensitive to wage gaps than farm workers. Used to working conditions in factories, industrial workers integrated easier into the host countries' labor market, which probably explains their higher mobility.

In other respects, close relations could contribute to the "social ascension myth" (Brun, 1980). Indeed, the fact of knowing successful persons abroad, people who spoke the same language, someone able to receive them and make easier their integration… probably helped to encourage potential emigrants. Moreover, lots of new migrants traveled thanks to the financial assistance of their predecessors: before World War I, between 30 and 40% of southern and eastern Europeans traveled with pre-paid tickets (Jerome, 1926). It is therefore logical to imagine that cultural, linguistic or ethnic preferences could have taken precedence, in some cases, on paying and working conditions. This kind of preferences may explain, among others, the scope of workers' movements between southern Europe and Latin America (Taylor and Williamson, 1997).

Business cycles and migration fluctuations

Even though international migration reacted first of all to structural determinants, business cycles played an important role in labor mobility. Expansion phases in immigration countries, especially in the United States, produced significant emigration waves in Europe. Inversely, periods of economic crisis in host countries contributed to restrain arrivals. For instance, the American economic prosperity during the years 1877-1882 (average growth: 7.6%) played a great part in drawing a considerable number of migrants to the American soil (789,000 in 1882 compared to 142,000 in 1877). In the same way, the year 1907, which holds the record in terms of US immigration (1.3 million new arrivals), followed a year of strong economic growth (11.5%). On the contrary, the 1893-1894 depression (-4.8% and -2.9%, respectively) brought about a massive downturn in the number of immigrants: -55.3% between 1892 (580,000) and 1895 (259,000).

Beyond growth rate fluctuations, most of the empirical studies show that the labor market situation in receiving countries significantly influenced workers' mobility (Kelley, 1965; Richardson, 1972; Hatton and Williamson, 1998). Figure 5 illustrates the relationship between unemployment and immigration rates in the United States between 1890 and 1913. It clearly appears that an increase in the U.S. unemployment rate was followed by a drop in the immigration rate, whereas an improvement of labor market conditions meant more foreign arrivals. In an empirical study on the British immigration between 1871 and 1913, Hatton (1993) estimates that an increase by 10% of the overseas employment rate would have raised gross emigration by 4.0‰ to 5.8‰. A similar increase in the domestic employment rate, as for it, would have lowered gross emigration by half this amount.

Figure 5
Immigration and unemployment in the United States: 1890-1913

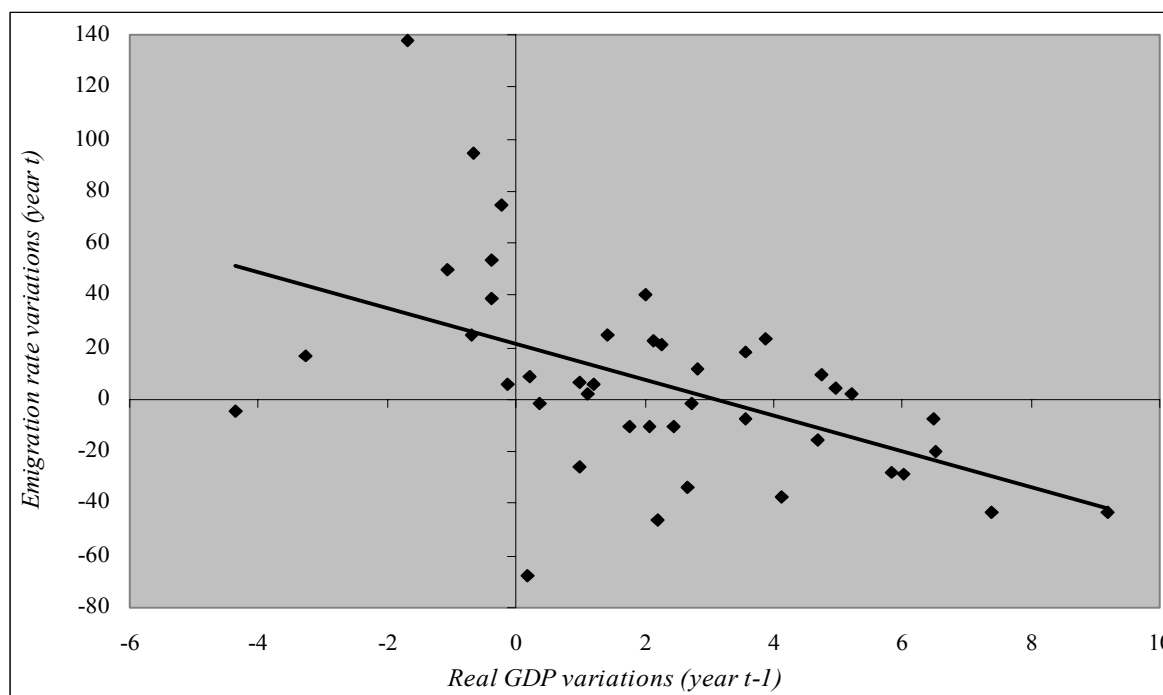*Note:* Correlation coefficient = -0.79.
Sources: Unemployment rate: Romer (1986); immigration rate: author's calculations based on Ferenczi and Willcox (1929) and Maddison (2003).

Some objections have been raised with regard to the ability of future migrants to precisely know labor market conditions on the other side of the Atlantic. Indeed, both distance and communication deficiencies might have prevented emigration candidates from having access to such information: *"Can the news of rising activity in America have crossed the Atlantic, have found its way into thousands of peasant homes in Germany and Ireland and Scandinavia, have led to decisions that now is the time for a move, to the collection of the means for the voyage, the long journey to the port of embarkation, the sea voyage to America – all within half a year? It is surely most improbable that any causal connection with so short a time lag can exist"* (Carter, 1955: 107). Yet, as Gould (1979) points it out, letters sent by close relations represented a widespread and reliable information channel. Friends, relatives, neighbors… directly witnessed hiring conditions, wages in force and, of course, redundancies. Therefore, it is possible to assume that labor market news circulated rather well, above all at the end of the nineteenth century and at the beginning of the twentieth, when the number of emigrants was already very high and that communication progress permitted to reduce the transmission time of information.

Of course, economic conditions in the host country (pull factors) were essential, but they cannot explain the totality of migration streams. The extent of migration hinged also on national economic conditions (push factors), and domestic business cycles played a major role in labor movements, as illustrated by the Swedish example (Figure 6). Actually, migration flows constituted

the extension of a long-term process of rural depopulation related to the Industrial Revolution: *"A steady stream of humanity leaves the European farm. In prosperity it is directed to the city and industry; in domestic depression abroad."* (Kindleberger, 1985: 149). Thus, the years 1877-1879, characterized by a depression in Sweden, came with an increase in the emigration rate (9.2‰ in 1880 compared to 1.7‰ in 1877, that is, an annual average rise by about 75%).

Figure 6
Migration fluctuations and business cycles in Sweden: 1871-1913

Note: Correlation coefficient = -0.52.
Sources: Author's calculations based on Ferenczi and Willcox (1929) for the emigration rate and Maddison (2003) for real GDP.

All in all, it is possible to speak of an "Atlantic economy", that is, an economic system where international trade and factor movements were dictated by activity fluctuations on both sides of the ocean (Brinley Thomas, 1954). In such a system, transatlantic migration corresponds to inter-regional mobility. By way of illustration, Dorothy Thomas (1941), in her study on Swedish population movements, considers that the good economic health in the United States only induced the Swedes to leave when domestic industry was down: *"In prosperous years, Swedish industry was able to compete successfully with the lure of America; and the latent agricultural push towards emigration became an active force only when a Swedish industrial depression occurred simultaneously with expanding or prosperous business conditions in the new world."* (Thomas, 1941) In the same perspective, Kelley (1965) underscores the interaction between the different labor markets of the old British Empire and migration inside the Empire: the phases of prosperity in the United States, in Canada or in South

Africa induced a drop in Australian immigration, whereas the slowdown in the activity in one or another of these countries, especially in the United States, entailed an increase in migration movements to Oceania (at least when the business cycles of theses different areas were not synchronized).

Current account, exchange rates and emigration

As seen previously, free labor mobility not only originated massive movements of people from Europe to the New World, but also contributed to smoothing business cycles. When European economies were in a low phase of the cycle, the incentive to cross the oceans increased. Migration flows then enabled to reduce pressures on the labor market of sending countries and stimulated economic growth in receiving countries. As a result, aggregate demand in the latter economies rose, which tended to swell imports, that is, trading partners' exports. In that sense, labor mobility represented an adjustment mechanism that furthered the return to the equilibrium position of current accounts. Thus, Fenoaltea (1988) shows that a current account deficit in Italy was followed by a rise in emigration, which helped to offset employment deterioration on the one hand, and to finance trade deficits thanks to migrants' remittances on the other hand (see Figure 7). This phenomenon apparently increased after 1887, when international investment, especially British investment, began to dwindle and that Italy had to transfer the adjustment burden on labor.

Figure 7
Emigration rate and current account in Italy: 1870-1913
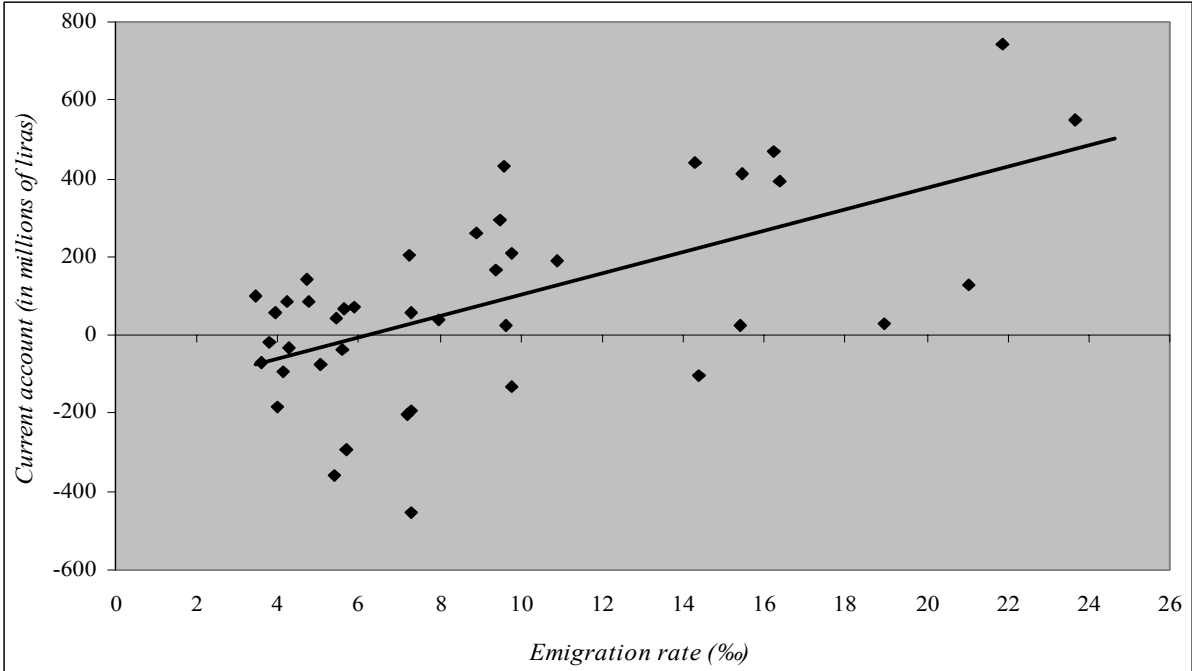
Note: Correlation coefficient = 0.61.
Sources: Emigration rate: author's calculations based on Ferenczi and Wilcox (1929) and Maddison (2003); current account: Mitchell (2003a).

This positive relationship between migration movements and current account was even stronger when sending countries chose to renounce to the exchange rate instrument. Figure 8 illustrates the trade-off between labor mobility and nominal exchange rate fluctuations in the adjustment process of the trade balance for sixteen European countries between 1890 and 1913. The x-axis represents the correlation between nominal exchange rate variations (year t-1) and trade balance variations (year t). The correlation is in general positive (10 countries out of 16), which corresponds to the fact that a rise in the exchange rate (depreciation) increases the competitiveness of the economy and then contributes to improving the trade balance. The y-axis shows the correlation between emigration rate variations (year t-1) and trade balance variations (year t). It is also positive in most of the case (15 countries out of 16), which can be explained by the fact that labor outflows bring about a fall in domestic consumption and then in imports, entailing an improvement in the trade balance (cf. Section II). The figure shows that the stronger the correlation between exchange rates and trade balance, the lower the correlation between emigration and trade balance. In other terms, the countries that did not belong to the gold standard could rely on exchange rate fluctuations to achieve trade balance adjustment, and did not require labor mobility to do that. On the contrary, gold standard countries, which renounced to the exchange rate instrument, transferred the burden of the adjustment to labor mobility.

Figure 8
Trade-off between labor mobility and exchange rate fluctuations: 1890-1913
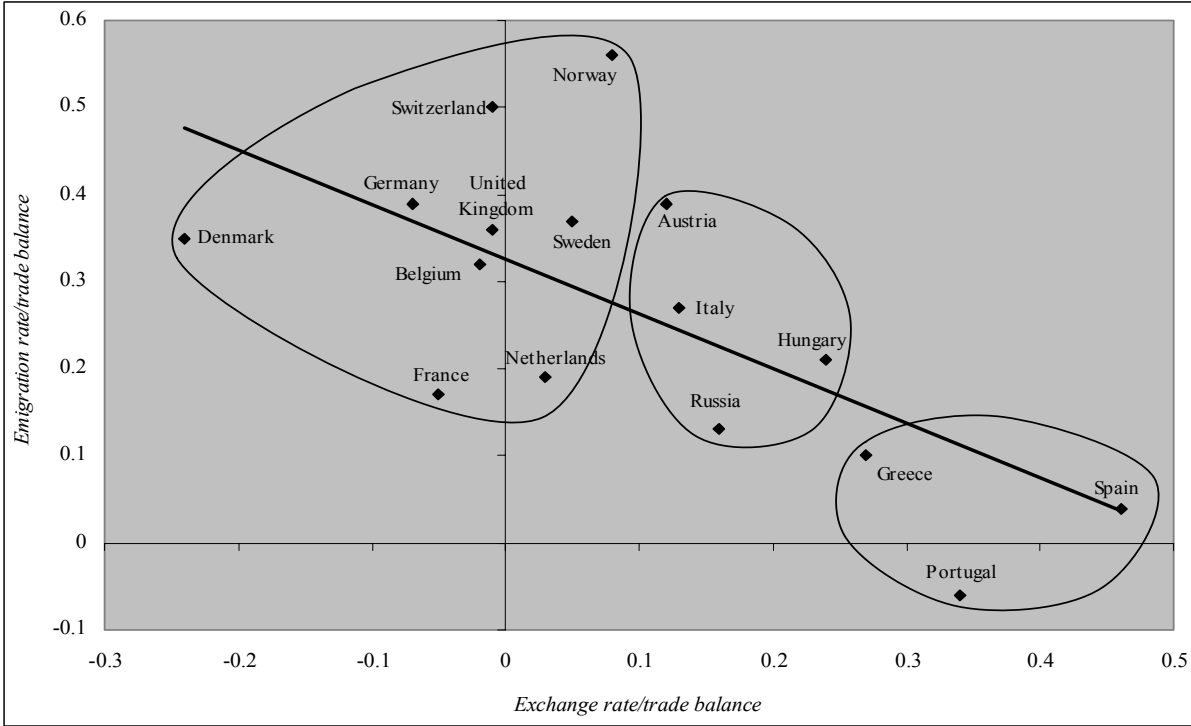

Note: See explanation above.
Sources: Author's calculations based on Ferenczi and Willcox (1929); Mitchell (2003a); Flandreau and Zumer (2004).

It is possible to identify three categories of countries. The first category gathers countries that belonged to the gold standard during the whole considered period. It consists of Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. These countries were characterized by a very low level of correlation between exchange rate and trade balance variations, which seems logical since their nominal exchange rates were stable. On the other hand, the relation between emigration and trade balance was relatively high. The second category includes countries that had flexible exchange rates during all the period (Spain and Portugal) or most of the period (Greece joined the gold standard in 1910). These countries showed very low levels of correlation between emigration rate and trade balance variations. On the contrary, the correlation between exchange rate and trade balance variations was relatively high. The last category comprises the countries that changed their exchange rate regime during the period, typically by adopting the gold standard rules (Austria-Hungary in 1896, Russia in 1897, Italy in 1902). They present an intermediate situation, which probably corresponds to the fact that the adjustment process first rested on exchange rate fluctuations and then resorted to labor mobility.

It is noteworthy that the emigration patterns in Austria-Hungary radically changed after the adoption of the gold standard by the monetary authorities. Figures 9 and 10 illustrate, respectively, the course of the exchange rate (one single currency for the whole Hapsburg Empire) and the emigration rate (by country) between 1871 and 1913. While exchange rates tended logically to stabilize after 1896, the emigration rate in both parts of the Austro-Hungarian currency union not only swelled, but also became more volatile. This observation is strengthened by the econometric tests presented in the next section.

Figure 9
Exchange rates in Austria-Hungary: 1871-1913
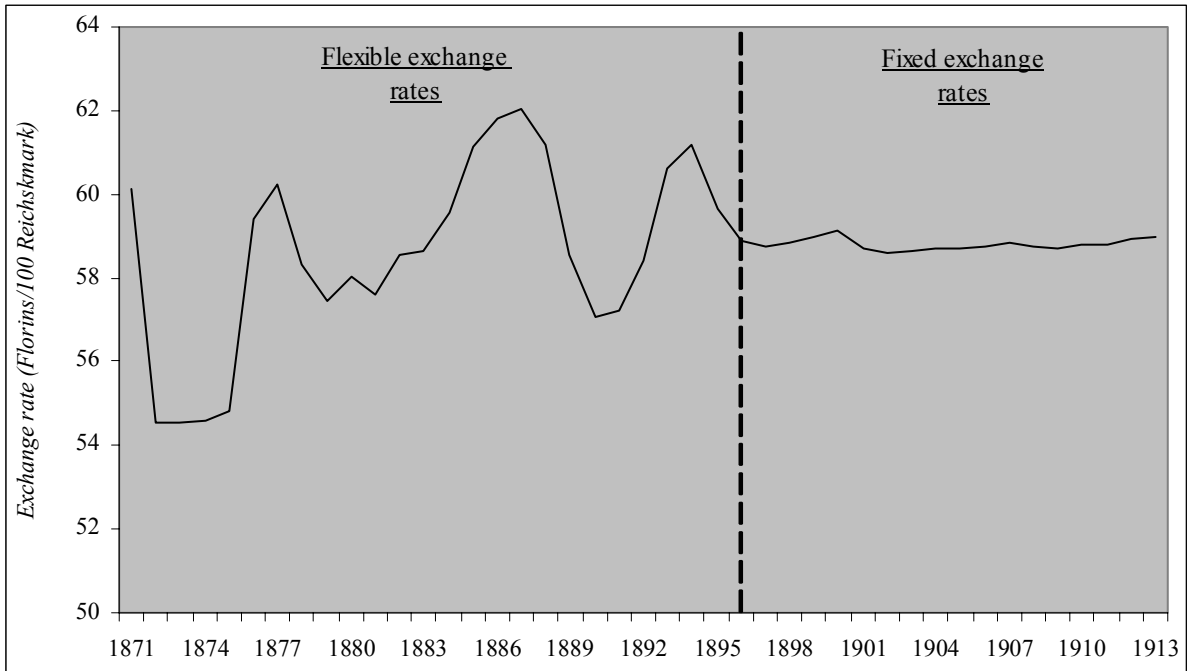
Source: Flandreau and Zumer (2004).

Figure 10
Emigration rate and exchange rate regime in Austria-Hungary: 1871-1913
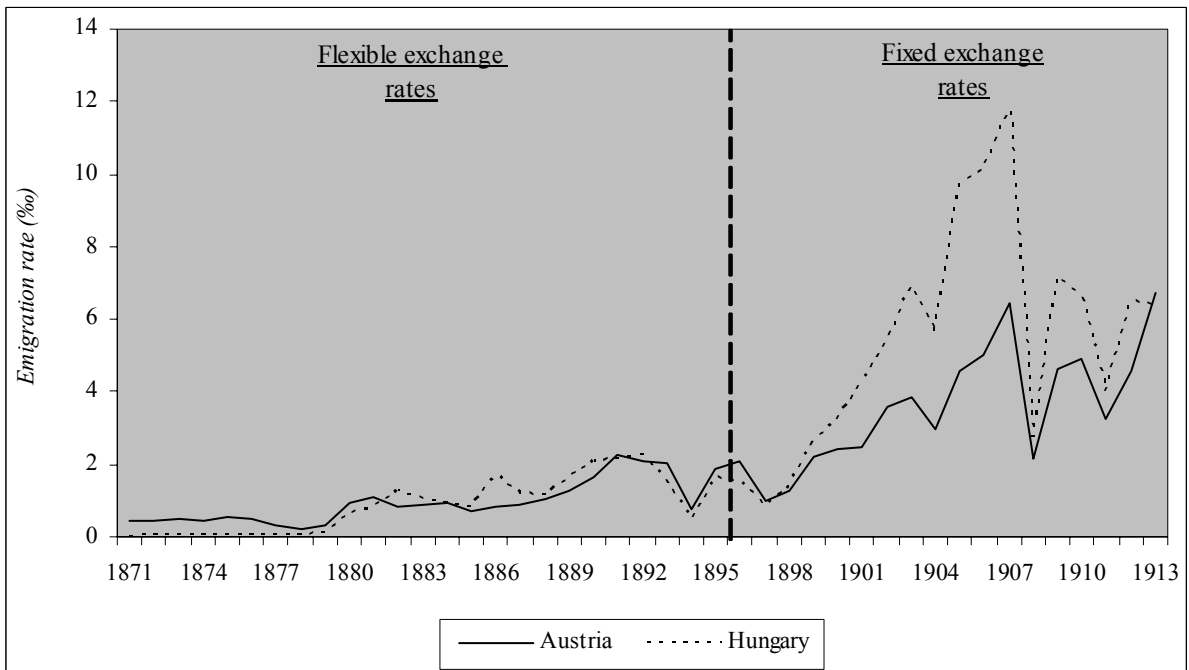
Sources: Author's calculations based on Ferenczi and Willcox (1929) and Maddison (2003).

V – International Migration and Current Account Adjustment: The Empirical Evidence

The basic model defined in equation 13 (Section II) is estimated with pooled least squares. The estimation encompasses fifteen European countries (Austria, Belgium, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, and the United Kingdom) and corresponds to the period 1881-1913. The dependant variable is the annual change in the trade balance $(\Delta trade)$. Explanatory variables (all in annual change) include the number of emigrants to the United States $(\Delta emig)$, the unemployment rate $(\Delta unem)$, the nominal exchange rate $(\Delta exch)$, domestic $(\Delta dcpi)$ and American $(\Delta uscpi)$ prices, the U.S. GDP $(\Delta usgdp)$ and the level of protection $(\Delta prot)$. In keeping with the Okun's law, the annual change in unemployment is proxied by the inverse of the annual change in GDP, that is, $\Delta unemp = -\alpha \Delta gdp$. The exchange rate is the relation between domestic currencies and the American dollar: an increase in the exchange rate means a depreciation of the domestic currency. Domestic and American prices are given by the respective CPI. The level of protection corresponds to the tariffs put on imports. *gold* is a dummy variable equal to 1 for countries that belong to the gold standard and 0 for countries with flexible exchange rates (see appendix). Finally, ε is a random perturbation. Therefore, the estimated equation is:

$$
\begin{aligned}
\Delta trade = {}& a \\
& + b_1 \Delta emig * gold + b_2 \Delta emig * (1 - gold) \\
& + c_1 \Delta exch * gold + c_2 \Delta exch * (1 - gold) \\
& + d_1 \Delta unem * gold + d_2 \Delta unem * (1 - gold) \\
& + e_1 \Delta dcpi * gold + e_2 \Delta dcpi * (1 - gold) \\
& + f_1 \Delta uscpi * gold + f_2 \Delta uscpi * (1 - gold) \\
& + g_1 \Delta usgdp * gold + g_2 \Delta usgdp * (1 - gold) \\
& + h_1 \Delta prot * gold + h_2 \Delta prot * (1 - gold) \\
& + \varepsilon
\end{aligned}
$$

Trade balance statistics are taken from Mitchell (2003a) and comes from national statistical yearbooks. *Emigration to the United States* is given by Ferenczi and Willcox (1929). The *Gross Domestic Product (GDP)* of most of the countries comes from Maddison (2003); Austrian and Hungarian GDP: Schulze (2000); Spanish GDP: Prados de la Escosura (1993); U.S. GDP: Romer (1989). The *Consumer Price Index (CPI)* of most of the countries is taken from Mitchell (2003a, 2003b); Spain: Bustelo and Tortella-Casares (1976); Portugal: Mata and Nuno (1996). *Nominal*

exchange rates and *exchange rate regimes* are from Flandreau and Zumer (2004). Lastly, *import tariffs* are given by Flandreau and Maurel (2001).

Table 2
Regression results: 1881-1913

Dependent variable: $\Delta trade$	Coefficient	t-Statistic
$\Delta emig * gold$	0.69	3.07***
$\Delta emig * (1 - gold)$	1.50	1.95*
$\Delta exch * gold$	179.83	1.93*
$\Delta exch * (1 - gold)$	112.70	2.38**
$\Delta unem * gold$	0.0016	1.04
$\Delta unem * (1 - gold)$	0.0187	2.00**
$\Delta dcpi * gold$	-4.08	-12.88***
$\Delta dcpi * (1 - gold)$	-3.54	-3.33***
$\Delta uscpi * gold$	0.27	3.04***
$\Delta uscpi * (1 - gold)$	1.09	2.43**
$\Delta usgdp * gold$	0.00015	2.48**
$\Delta usgdp * (1 - gold)$	0.00019	1.66*
$\Delta prot * gold$	214.92	3.26***
$\Delta prot * (1 - gold)$	391.04	3.30***
Fixed effects		
Austria	-42.80	
Belgium	-40.72	
Italy	-40.71	
Germany	-27.11	
Netherlands	-23.16	
Switzerland	-19.80	
France	-9.68	
Hungary	-9.56	
Denmark	-3.05	
Norway	-3.68	
Portugal	0.96	
Sweden	2.52	
Spain	3.01	
United Kingdom	3.17	
Russia	3.73	
Number of observations	439	
R^2	0.43	
Adjusted R^2	0.36	
F-statistic	8.82	

Note: * significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level.

The results of the regression are reported in Table 2. The t statistics are corrected for heteroskedasticity with the White procedure. All the coefficients have the expected sign for countries belonging to the gold standard ("gold") as well as for the ones with flexible exchange rates ("non gold"). An increase in emigration and/or unemployment brings about an improvement in the trade balance. Indeed, they both correspond to a reduction in labor input, therefore in production and in aggregate demand. The upshot is a drop in imports, which contributes to the rise in the trade balance. In other respects, all the components of the real exchange rate play their role either as a deterrent or as a spur of the competitiveness of the analyzed countries. Thus, an increase in nominal exchange rate contributes to the improvement in the trade balance through a rise in national competitiveness. In the same way, when American prices go up, exports augment and imports slow down. On the contrary, domestic inflation is synonymous with low competitiveness and worsening of the trade balance. As anticipated by the model, the growth of the American GDP generates an improvement in the trade balance, due to the increase in exports brought about by the rise in American demand. Finally, the development of tariffs entails a reduction in imports, that is, an increase in the trade balance.

Now, what are the differences between "gold" and "non gold" countries? First of all, it is important to focus on the trade-off between emigration and exchange rates. The coefficient for emigration in "non gold" countries (1.50) is 2.2 times higher than the coefficient for "gold" countries (0.69). It is also less significant than the latter (the "non gold" countries' emigration coefficient is only significant at the 10% level whereas the "gold" one is significant at the 1% level). On the other hand, the coefficient for the exchange rate is 1.6 times higher for "gold" countries (179.83) than for the "non gold" ones (112.70). And the level of significance is lower for the former (10%) than for the latter (5%). This difference in the coefficients can be explained by the respective degree of volatility of emigration and exchange rates, and by the elasticity of the trade balance to variations in the respective variables. In "gold" countries, the exchange rate is, by definition, stable and its volatility is low. On the contrary, "non gold" countries experience a higher level of exchange rate volatility. Therefore, the sensitivity of the trade balance to exchange rate fluctuations is higher in countries where fluctuations are low, which explains that the coefficient is higher in "gold" countries. In the same way, volatility of labor mobility in "non gold" countries is lower than in the "gold" ones, and the elasticity of the trade balance to variations in emigration is higher where the emigration volatility is low. These results are in accordance with the analysis related to Figure 10 and confirm the existence of a trade-off between labor mobility and nominal exchange rate fluctuations in the adjustment process of the trade balance.

The differences in other coefficients are also symptomatic of the dissimilar patterns of adjustment between fixed and flexible exchange rate regimes. Thus, the variations in unemployment are only significant in the latter case, which is consistent with the fact that "gold" countries resorted to labor mobility in case of a current account disequilibrium, and that emigration and unemployment are going in two opposite directions (labor outflows contribute to lowering the unemployment rate). In other respects, variations in domestic and American prices are highly significant, whatever the

exchange rate regime, which corroborates the fact that price flexibility is important in terms of trade balance situation. Concerning competitiveness, it seems that "non gold" countries where more sensitive to variations in American prices, i.e. that a small increase in the U.S. prices had a stronger impact on the level of imports (and maybe too on the level of exports) than in the case of "gold" countries. As for variations in American GDP, the coefficients are pretty much the same and the level of significance is identical (5%). Finally, the impact of protectionism differs according to the exchange rate regime: the coefficient of variation of import tariffs is much higher in the case of "non gold" countries (391.04) than for "gold" countries (214.92), which reveals that, in general, countries with fixed exchange rates tended to resort more often to changes in trade policy in order to deal with their current account problems, while "non gold" countries could rely on variations of the exchange rate.

In total, the results of the regression are consistent with the predictions of the model defined in Section II. Above all, econometric tests establish the existence of a trade-off between emigration and exchange rate variations. The countries that opted for pegging their currency to gold were using labor mobility as a key adjustment instrument, while other countries could rely on exchange rates fluctuations to guarantee the current account equilibrium. As a complement, price variations were important in both exchange rate regimes, unemployment variations really mattered only in the case of "non gold" countries, and changes in trade policies were more frequent in "gold" countries. Eventually, the results tally with the hypothesis ventured all through this paper: international migration was an essential adjustment mechanism for countries that followed a fixed exchange rate policy, and constituted an efficient alternative to other adjustment instruments. Consequently, it seems reasonable to maintain that the success of the gold standard was partly due to the free labor mobility that prevailed before World War I.

Conclusion

The analysis of the operation of the classical gold standard confirms Mundell's theory of optimum currency areas: the adoption of fixed exchange rates implies that, in case of asymmetric disturbances, workers should flow from regions in recession to expanding regions. In that sense, the free labor movements that characterized the pre-1914 world most likely helped gold standard members to maintain the stability of their currency, and contributed to lowering the costs of their fixed exchange rate policies. Actually, sticky nominal wages, difficulties for "peripheral" countries to attract foreign capital, and the absence of public counter-cyclical intervention strengthened the role of labor mobility as an adjustment mechanism in the countries that opted for pegging their currency to gold. Thus, econometric tests for the period 1881-1913 show that there was a strong link between the prevailing exchange rate regime and labor flow patterns: while significant variations in the emigration rate fostered the adjustment of the trade balance in the countries that belonged to the gold standard, countries with flexible exchange rates experienced much less volatility in their emigration rate, or at

least the correlation between variations in the emigration rate and changes in the trade balance was lower. For these countries, exchange rates constituted the main adjustment mechanism.

The importance of labor mobility in the success of fixed exchange rate regimes also seems to be corroborated by the brief functioning of the gold exchange standard during the interwar years. This period was marked by a fall in international migration, essentially due to the implementation of border controls in the main immigration countries. Therefore, labor mobility could not play anymore its role as an adjustment mechanism for the countries that decided to defend the parity and the convertibility of their currency. Since wage flexibility and capital mobility were also limited, the economies that had to suffer the effects of the Great Depression were constrained to sacrifice their fixed exchange rate policy. This was the only rational response in the international context of trade war and increasing unemployment. Actually, exchange rate flexibility fostered the return of growth and contributed to reducing unemployment levels (Eichengreen, 1992).

The existence of a link between exchange rate regimes and labor mobility has several implications in terms of migration policies. Actually, the current globalization process is characterized by significant flows of goods, services and capital, but international labor movements remain limited. Therefore, and not surprisingly, our world is not an optimum currency area, which partly explains the need to use flexible exchange rates. But if efforts were made in terms of international openness of labor markets, it is likely that fixed exchange rate policies would be more successful, which would bring about in particular a decrease in the transaction costs that come with flexible exchange rates. Moreover, freer international labor mobility would entail a better allocation of resources and then would contribute to increasing international growth.

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Appendix

Exchange rate regime: 1881-1913

Year	Bel	Den	Fra	Ger	Net	Nor	Swe	Swi	UK	Aus	Hun	Rus	Ita	Por	Spa
1881	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0
1882	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0
1883	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0
1884	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1885	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1886	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1887	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1888	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1889	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1890	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0
1891	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0
1892	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
1893	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
1894	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
1895	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
1896	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
1897	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1898	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1899	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1900	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1901	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
1902	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1903	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1904	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1905	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1906	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1907	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1908	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1909	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1910	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1911	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1912	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1913	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Notes: List of the countries: Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, Switzerland, United Kingdom, Austria, Hungary, Russia, Italy, Portugal, Spain. 1 means that the country adopted a fixed exchange rate regime (gold standard, gold exchange standard or gold peg), 0 refers to countries with flexible exchange rates.
Source: Flandreau and Zumer (2004).