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Conscription and the Developing Countries

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Abstract

Many countries, mostly ones with developing economies, still have conscription. This study explains why, based on the costs of different recruitment systems. A conscription system misallocates labor compared to all-volunteer recruitment but entails a smaller wage bill. In developing countries, the costs of establishing a conscription system may be large, but the misallocation of labor caused by conscription is likely to be less than in the developed countries, and the excess burden of taxes needed to finance the higher wage bill of an all-volunteer military are likely to be greater. These considerations, based on cross-country regression analysis, partly explain why many developing countries continue to impose conscription even as the developed countries seem to be abandoning it.

Keywords: conscription, tax systems in developing countries

JEL Classification: H20, H21, O17

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Conscription and the Developing Countries

1. Introduction

This is an original contribution on the economics of military conscription, with special attention to the design of tax systems of developing countries. The persistence of conscription in the developing countries, even though the developed countries seem to have one-by-one been abandoning it in favor of all-volunteer systems, has been remarked by many but never yet explained. We offer an explanation, based on the cross-country differences in cost of a conscription system compared to an all-volunteer recruitment system, as represented in the model of Mulligan and Shleifer (2005). Cross-country Probit and Tobit estimates of the likelihood of using conscription support our explanation.

Figure 1. Length of obligation service and GDP per capita

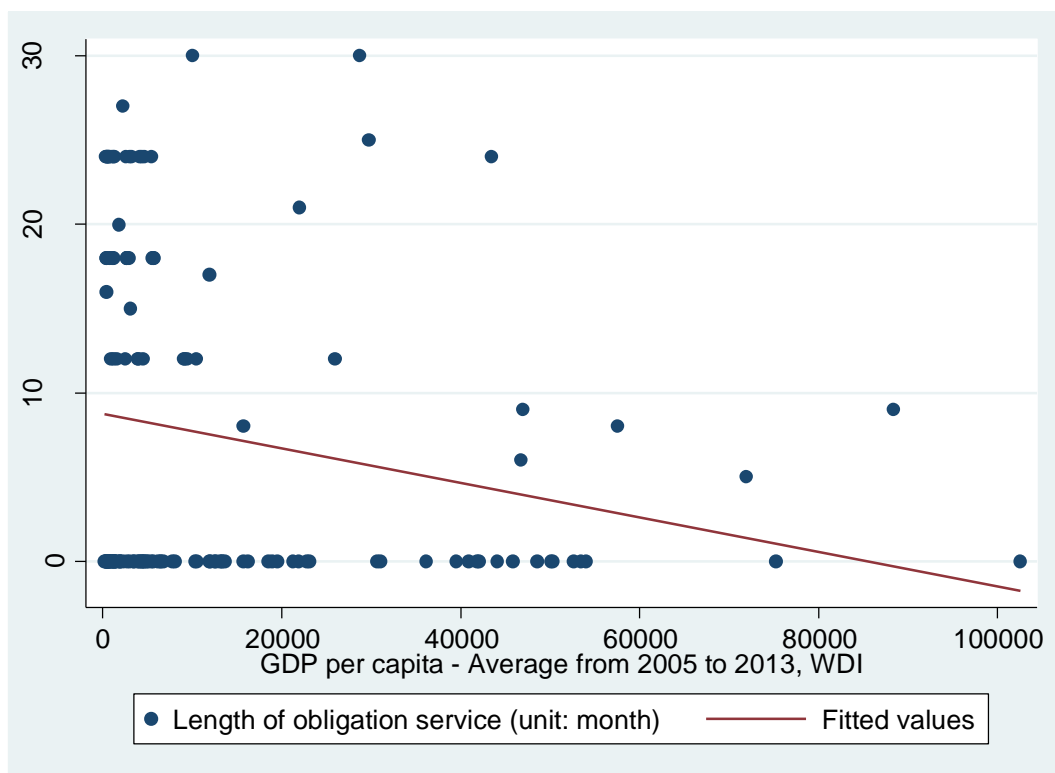


Figure 1 shows the inverse relationship of GDP per capita and the lengths of obligation services. It means that countries with higher income are less likely to have military conscription or require a relatively smaller burden for draftees. However, in the study of Mulligan and Shleifer (2005), the effect of GDP per capita on military

conscription is not significant. This might suggest that GDP per capita might affect the method of enlistment indirectly by different channels, which emphasize the cross-country variation in the social cost military conscription comparing with voluntary army.

The model of Mulligan and Shleifer (2005) is simple yet general enough to accommodate key differences between rich countries and poor ones. A conscription system misallocates labor compared to an all-volunteer system but entails a smaller wage bill. Poor countries collect taxes where they can, which often means the taxes are highly distorting and have high excess burdens. In the rich countries, taxes are broad-based and so entail smaller excess burdens than in the poor countries. The rich countries have gradually come to rely less on distorting tax sources including customs duties, government monopolies, and inflation of the currency. Military conscription—a tax in-kind on labor—can be added to the list of distorting taxes that persist mostly in the developing countries, a reflection of the constraints facing developing countries. Simply put, in a developing country, where the informal sector of the economy is large, taxes that might be less distorting are easier to evade and harder to collect. Furthermore, the particular distortions of military conscription, arising from the misallocation of labor, are likely to be small in a developing country where labor skills are relatively homogeneous compared to most developed countries.

2. Theoretical framework

2.1. Tax implications of conscription

There are two opposing ways that the fiscal resources needed to fund a conscription system differ from that of an all-volunteer system. First, conscription has specific costs of administration, especially for enforcement measures, and the costs of such administration, including set-up costs, can be large. But a second and opposing factor is that, with conscription, the wage bill is less than for an all-volunteer system. Draftees are paid a lower wage than would have been needed to elicit their voluntary enlistments. If a large fraction of the population of a set age are to be drafted, then the (mostly fixed) cost of administration and enforcement of a conscription system can be outweighed by its lower wage bill compared to an all-volunteer system of recruitment. In this case, conscription imposes a smaller drain on the fiscal resources of the

government than would an all-volunteer system of recruitment. Similarly, because many of the costs of administering and enforcing a conscription system are fixed costs, if a small fraction of the eligible population is to be drafted, then conscription probably requires more fiscal resources than an all-volunteer system. This explains why the rich countries resorted to conscription during the World Wars but reverted to all-voluntary recruitment after the wars ended and they downsized their armed forces.

Besides its effect on the fiscal position of the government, conscription also differs in the excess burden it imposes compared to an all-volunteer system of recruitment. Conscription is a tax-in-kind. Its burden, equal to the difference in wage actually paid and the lowest wage needed to elicit voluntary enlistment (reservation wage), falls on the draftee. But the costs of administering a conscription system and the stipends that must be paid even to draftees, require still further taxes. As described in the previous paragraph, the fiscal resources needed to maintain a conscription system can be either greater or less than are needed to maintain an all-volunteer system that recruits the same labor services. The total burden (fiscal burden plus excess burden) of a conscription system compared to an all-volunteer system equals the excess burden that is borne by the draftees plus the difference between the two systems in burdens of the other taxes needed to cover the wage bill and the costs of administration and enforcement (and that difference can be positive or negative—more likely to be negative the larger the government staff being recruited).

The excess burden that is borne by draftees arises as a misallocation of their labor. Reluctant draftees—whose reservation wages are higher than the wages they are paid once drafted—have alternatives to military service that they value more. The alternatives can be leisure, investment in education, or supplying labor in other markets. Conscription harms draftees' professional careers by depreciating existing skills or by preempting the acquisition of new skills. Imbens and Van der Klaauw (1995) found that former draftees have 5% lower salaries than their birth cohorts, on average. The excess burden of the labor tax-in-kind that is conscription, is the waste from employing the wrong persons in military service. The budding professional is plucked out of school or out of a promising job where his or her efforts are productive, and wastefully set to work peeling potatoes and mopping floors (or firing a bazooka)—tasks that another could do at lower cost.

In spite of the excess burden that is specific to a conscription system—the misallocation of labor that it induces—the total burden of taxes needed to recruit and maintain an all-volunteer force can be even greater than the total tax burden of a conscription system, particularly if the size of the force to be recruited is large. Perhaps we should expect conscription to be more likely in countries where its total burden is less than that of an all-volunteer system. That is the principle behind the Mulligan and Shleifer (2005) model that is also the framework of this paper. We will have more to say about that model in the next section, for our aim is to extend the model to accommodate differences in tax systems across countries. We will argue that within the Mulligan and Shleifer model, differences in tax systems between developing and developed countries affect the relative likelihood that conscription would have a lower total tax burden than an all-volunteer system of recruitment.

Table 1. Conscription and tax system

GDP per capita	Countries having draft in 2012	EFW index for conscription	Average tax revenue from 2005 – 2013 (% GDP) ^a	
< 2000 USD	48.33%	5.88	18.35%	
2000 – 6000 USD	56.33%	5.07	21.15%	
6000 – 12000 USD	36.36%	7.00	33.04%	
> 12000 USD	26.00%	7.82	40.71%	

GDP per capita	Income tax ^b	Individual income tax ^c	Border tax ^d	Goods and service tax ^e
< 2000 USD	35.30%	36.27%	16.83%	44.20%
2000 – 6000 USD	27.48%	25.63%	11.79%	48.46%
6000 – 12000 USD	24.59%	34.67%	3.08%	45.92%
> 12000 USD	38.24%	74.30%	2.25%	22.53%

^a: weight by GDP, ^{b, d, e}: weight by total tax revenue, ^c: weight by income tax

Source: Prichard, Wilson, Alex Cobham and Andrew Goodall (2014)

There is a difference in tax structure between developing and developed countries. As can be seen in Table 1, average government revenue in low income countries is about 18% of GDP, comparing with 40% of GDP in high income countries. Besides, high income countries only collect 2.25% of their revenue from border tax, and about 22% from tax on good and service, whilst these figure in the low income countries are about 16% and 45%. Another significant feature that is also emphasized in Gordon and Li (2009) is the difference on collecting income tax. In high income countries, about 74% of their income tax is from individuals, whilst this figure in low

income and middle income countries are around 30%. Conscription also shares the same patterns with tax structure. About 50% of low and lower middle income countries have military conscription, whilst 75% of high income countries recruit all-voluntary force. Using EFW index as a measure to consider conscription, the average index for low income countries is 5.88, whilst it is 7.82 for high income countries.

Tax systems differ across countries because the constraints on design of a tax system matter. The costs of administering and enforcing tax rules are the important constraints, and these differ between developing and developed countries. Gordon and Li (2009) describe and model the differences in tax systems between developing and developed countries. Governments of developing countries generally collect less tax revenue in relation to GDP than do the governments of developed countries. Furthermore, the governments of developing countries collect more of their tax revenue from customs duties, seigniorage, consumption taxes and production taxes, and less from income taxes, compared to the governments of developed countries. Also, most of the income tax revenue in developing countries comes from corporate income tax, not personal income tax. Gordon and Li explain these patterns by arguing that the relatively large informal sectors of the developing countries make it easier for their citizens to evade taxes on consumption or personal income. The developed countries are better able to collect revenue from taxing personal income because more of their citizens and businesses have bank accounts and are officially registered with government authorities. That is why the governments of developed countries have largely abandoned sources of revenue with large excess burdens such as customs duties, seigniorage and government monopolies, but are still able to collect more revenue in relation to their GDP than is characteristic of the governments of developing countries.

Other scholars have made a similar argument. Slemrod (1990) and Besley and Persson (2014) also describe the difficulty of collecting taxes in developing countries because of their large informal sectors and inadequate institutions, including banks, securities markets with listing requirements, civil bureaucracies and so on.

2.2. The costs of different recruitment systems

Mulligan and Shleifer (2005) provide a simple algebraic model for representing the social cost—that is to say, the total tax burden—of each different system of

recruitment into government (military) service: voluntary, universal conscription, conscription with exemption and conscription with replacement or commutation. Most of the countries with conscription also recruit a certain number of volunteers as professional soldiers. In light of this fact, in the Mulligan and Shleifer scheme, a “voluntary system” is defined as an all-volunteer system, while “conscription” systems are understood to be mixed systems; they have both draftees and volunteers. “Universal conscription” means that draftees are chosen completely randomly (or with certainty) from among an age cohort. Conscription with “exemption” means that students, parents, workers in designated industries, and such, are exempted from service. And conscription with “replacement or commutation” means that a draftee may pay another person to serve in his or her place, or may pay a monetary tax in lieu of service. Conscription with exemption, or with replacement or commutation, does not necessarily misallocate labor compared to an all-volunteer system, but as Mulligan and Shleifer argue, these systems are likely to have larger set-up costs of administration compared to universal conscription.

In the Mulligan and Shleifer model, subscripts $i = v, u, x$ and r , stand for voluntary, universal conscription, conscription with exemption, conscription with replacement. They denote by ρ_i the fixed cost of each method of enlistment, including fixed adoption, administration and enforcement costs. They denote by $mN\delta_i c(m)$ the variable cost of recruitment including deadweight losses, opportunity cost and other variable costs. N is the total population, and m is the fraction of soldier in total population, so mN is the number of troops. Here, $c(m)$ denotes the rising average opportunity cost of recruiting the fraction m in the whole population, and $\delta_i c(m)$ is the average variable cost for each soldier in the type i of enlistment.

Mulligan and Shleifer argue that:

$$0 = \rho_v < \rho_u < \rho_x < \rho_r$$

$$1 = \delta_r < \delta_x < \delta_u < \delta_v$$

They reason that the fixed cost of a voluntary system is lower than for universal conscription, $\rho_v < \rho_u$, because conscription requires special government monitoring and enforcement. For example, every young person has to register with the government when he or she reaches a certain age. The health of all potential draftees has to be

checked. And in conscription with exemption the fixed cost is even greater, because the authorities have to confirm that those who claim exemptions truly meet the qualifications. For instance, they might require notarized certificates and so on, with the necessary bureaucratic apparatus to handle such documentation. Finally, conscription with replacement allows a draftee to pay another person to serve in his or her place. The administrative costs of such a system are evident. Another point that increases the fixed cost of conscription generally compared to an all-volunteer system is the cost of training new recruits. Professional soldiers serve long tours of duty, while conscripts typically serve two years or less. Every new soldier has to be trained. This training requires facilities and personnel. Conscription means that the army has to train more people, which means more cost.

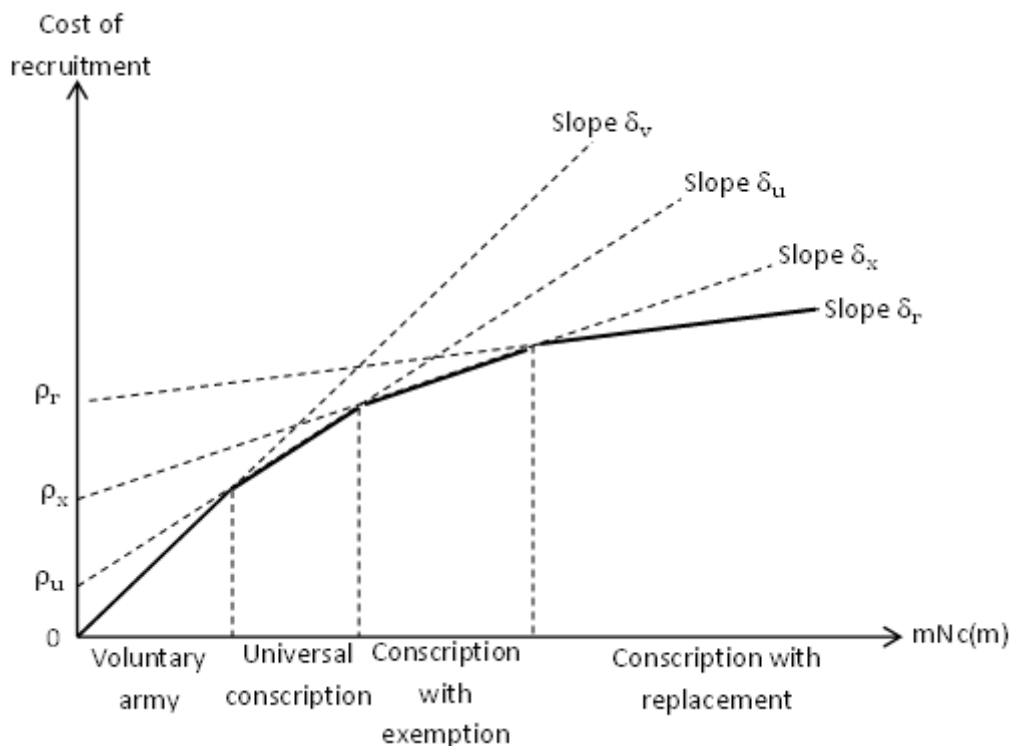
In conscription with replacement, the average variable cost per soldier $\delta_i c(m)$ is the lowest of any of the recruitment systems, and so its parameter is normalized as $\delta_r = 1$. Conscription with replacement has the lowest variable cost because, with replacement, conscription entails no misallocation of labor and amounts to a lump-sum tax falling on each draftee. The variable cost of an all-volunteer army includes the deadweight loss from taxes needed to fund the wage bill which is the highest of any of the systems, so that δ_v must be larger than 1. Universal conscription lowers the wage bill but misallocates labor so its average variable cost lies between the all-volunteer system and a conscription system with exemptions: $1 = \delta_r < \delta_x < \delta_u < \delta_v$.

Figure 1 below is reproduced from the Mulligan and Shleifer (2005) paper and summarizes their model. Mulligan and Shleifer presume that each nation adopts the system of recruitment with the lowest social cost, meaning the lowest tax burden. In their model, holding the fixed cost of each system constant, a country is thus more likely to introduce conscription the greater the fraction of the population it wishes to recruit. As we will explain, it is also more likely to introduce conscription, the greater the excess burden of its taxes in relation to tax revenue, and the smaller the excess burden that would be borne by draftees.

An original contribution of Mulligan and Shleifer is to highlight the importance of the fixed cost of establishing and operating each kind of recruitment system. They argue that the countries with a French heritage are likely to have a system of government administration that is better adapted to the implementation of a conscription

system, compared to other countries, and in particular compared to countries with a British heritage. They argue that the countries with British colonial heritage are less likely to have conscription systems.

Figure 2. The costs of different systems of recruitment, Mulligan and Shleifer (2005)



$$1 = \delta_r < \delta_x < \delta_u < \delta_v$$

2.3. The relative costs of different systems of recruitment in developing and developed countries

As discussed in section 2.1., there are major differences in the tax systems of developing countries and developed countries, which have been highlighted by Gordon and Li (2009). We next want to consider what those differences imply about conscription in the developing countries, using the Mulligan and Shleifer framework.

Developing countries rely on taxes that are more distorting and have higher excess burden in relation to the revenue they generate than do the developed countries, and so collect less taxes in relation to GDP. The demand for government staffing is therefore generally less in developing countries than in developed ones, which in the

Mulligan and Shleifer framework suggests less reliance on conscription in the developing countries.

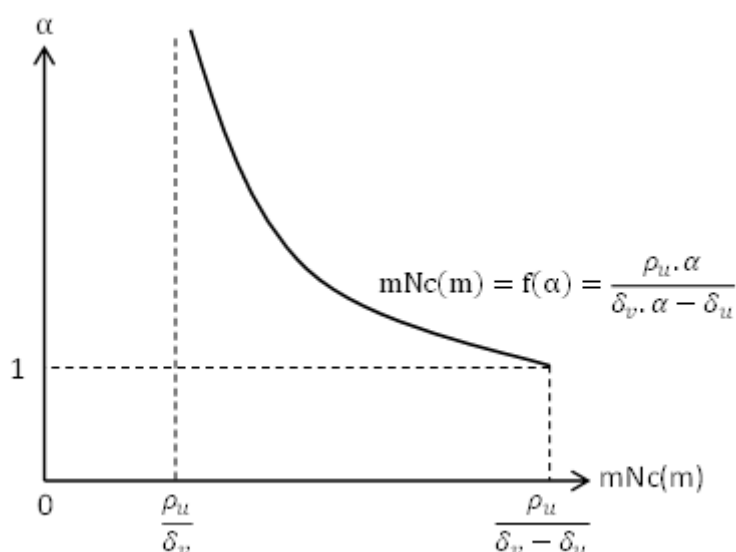
Although the Mulligan and Shleifer model is focused on military recruitment, it seems applicable to recruitment of government workers generally, not just armed forces personnel. Draftees need not be used only as soldiers. Their labor services are fungible with those of other government employees who sort and deliver mail, put out fires, walk police beats, guard prisons, shuffle papers, and do whatever other tasks government employees are charged with performing. Comparing across countries, the size of the government sector, and not just the size of the military, is a relevant exogenous influence on the fiscal burden of a conscription system compared with that of an all-volunteer system. The upshot is that countries with smaller government sectors are more likely to have an all-volunteer recruitments system. However, there are other differences to consider.

The highly burdensome taxes that governments in developing countries with large informal sectors must rely upon—customs duties, seigniorage, profits from government monopolies, and so on—mean that their variable cost of staffing a government labor force or army by an all-volunteer system is greater than that of a developed country that can levy less distorting taxes such as a broad-based consumption tax or personal income tax with low marginal tax rates but high yields. To put it another way, δ_v in developing countries must be larger than in developed countries. But the same consideration would also increase the fixed cost of establishing a conscription system, ρ_u . In the Mulligan and Shleifer framework, the minimum staffing requirement at which a conscription system has lower cost than an all-volunteer system is

$$mNc(m) = \frac{\rho_u}{\delta_v - \delta_u}.$$

If the average variable cost of a voluntary system, δ_v , and fixed cost of establishing a universal conscription system, ρ_u , are both increased by the same factor $\alpha > 1$, then $\frac{\rho_u}{\delta_v - \delta_u}$ falls, meaning that conscription is more likely to be adopted. This is shown in the Figure 3.

Figure 3. The conscription point and difficulty in collecting tax



In short, the inefficient tax systems of developing countries would, all else equal, incline them toward conscription. Here, the “other things” being equal include the staffing need of the government in relation to the labor force, which we just argued in the previous paragraph is likely to be smaller in a developing country—and which inclines developing countries to rely less on conscription. There is still another important difference between developing and developed countries.

The misallocation of labor induced by a conscription system is likely to be smaller in a developing country than in a developed country. The misallocation arises because draftees are selected randomly, and not according to their comparative advantages at supplying the particular labor services that are wanted. Skilled workers are drafted and set to work performing unskilled labor. With an all-volunteer army, only those with low opportunity cost would join the army to supply unskilled labor, while others would choose to stay in the civilian sector. In the developing countries, there are fewer skilled workers, and so the variation in skills within the labor pool is less than in the developed countries. Any social cost that arises from drafting the “wrong” persons is therefore likely to be smaller in a developing country than in a developed country. Within the Mulligan and Shleifer framework, this means that the average variable costs for conscription, δ_u , δ_x and δ_r , are smaller in developing countries than in developed

countries. Developing countries are to that extent more likely to have conscription than developed countries, again, all else equal.

With these ideas, the model of Mulligan and Shleifer (2005) can be redrawn as two cases for developing and developed countries in Figure 2 and Figure 3. In line with our previous discussion, the figures are constructed so that developing countries have lower average variable cost of a voluntary system and (equi-proportionately) higher fixed costs of conscription systems, and lower average variable costs of conscription systems. As shown in Figure 3 (developing countries), the range of staffing needs for which an all-volunteer recruitment system has the lowest cost is narrower than in Figure 2 (developed countries). For any given government staffing requirement, developing countries are relatively more likely to impose conscription. However, we have also suggested that developing countries are likely to have smaller government sectors and smaller government staffing requirements. Empirical investigation is needed to determine whether and how well the model explains the cross-country variation in recruitment systems.

Figure 4. The cost of different method of enlistment in developed countries

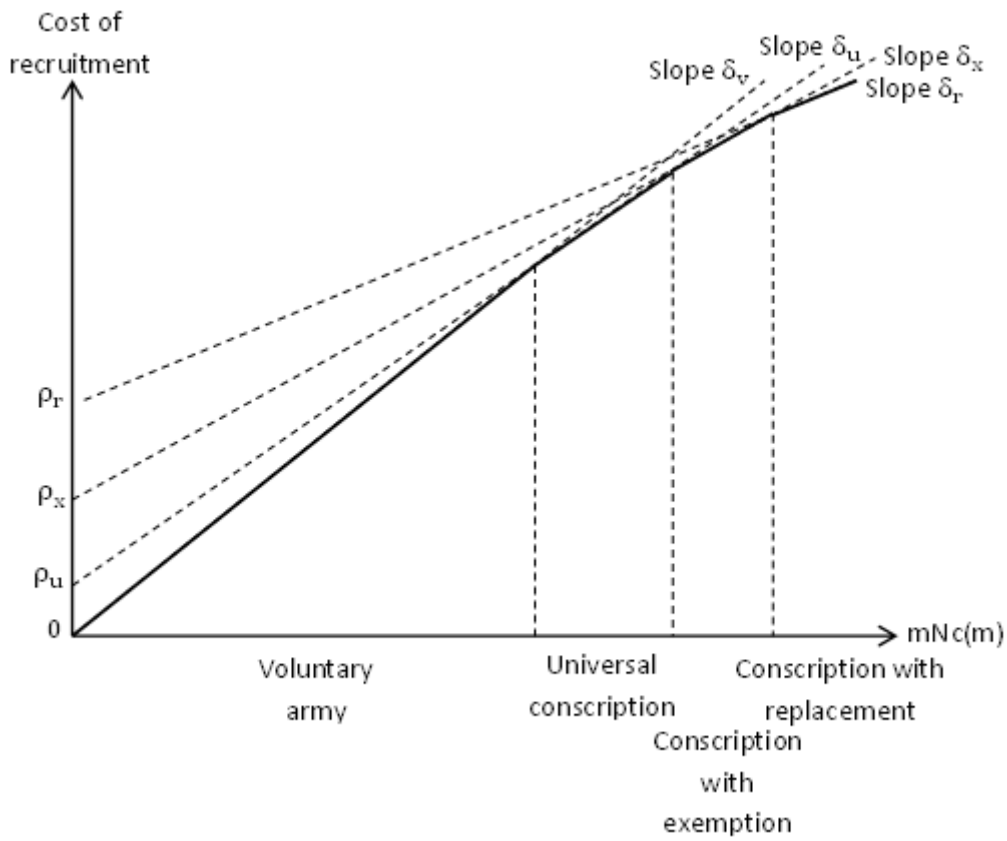
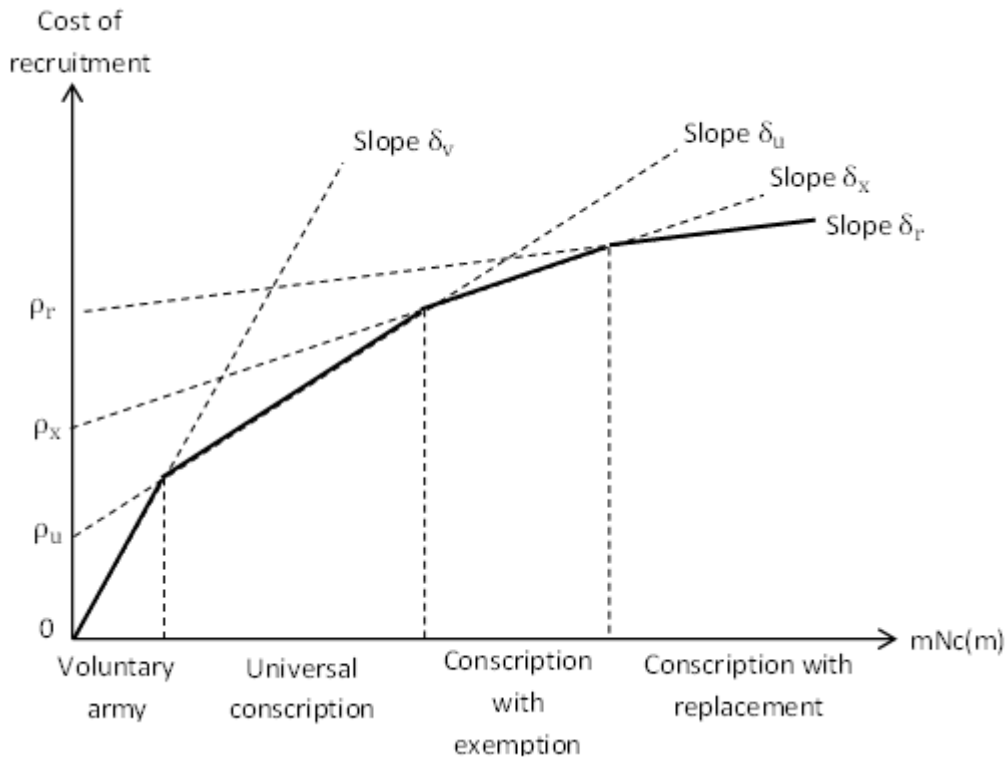


Figure 5. The cost of different types of enlistment in developing countries



3. Empirical analysis of cross-country variation in recruitment systems

We have collected an international dataset on the incidence of conscription across countries and on features of the countries' economies, tax systems, government sectors, and labor forces that are possibly related to the relative cost of a conscription system compared to a voluntary system. We use these data to see how well the ideas of the previous section explain the cross-country variation in recruitments systems.

The variables used in the empirical analysis are listed in Table 1, along with their sources. The Appendix A.1 describes the sources in detail. The numbers of observations, means, standard deviations, and ranges for each of the variables are shown in Table 2. A correlation matrix with p-values is reported as Table 3.

3.1. Empirical model and result

The general specification is a cross-country estimating equation representing the likelihood that a country has adopted an all-volunteer recruitment system. Where the dependent variable is *draft* (=0 if all-voluntary recruitment system, =1 otherwise) the specification is probit. Where the dependent variable is *EFWbased* (=approximate length of service obligation of each draftee, in months) the specification is Tobit.

With the available theoretical framework and data, a statistical model for cross-country analysis is constructed from the following:

$$\begin{aligned}\zeta = & \beta_0 + \beta_1 \cdot govrev_i + \beta_2 \cdot informal_i + \beta_3 \cdot milsize + \beta_5 \cdot gdpper_i + \beta_6 \cdot tertiary \\ & + \beta_7 \cdot GINI_i + \beta_9 \cdot communist_i + \beta_{10} \cdot British_i + \beta_{11} \cdot wgi_i + \beta_{12} \cdot gpi_i \\ & + u_i\end{aligned}$$

In the Probit specification, $u_i \sim N(0, 1)$ and

$$\Pr(draft = 1) = \Phi(\zeta),$$

in which: Pr denotes probability and Φ is the Cumulative Distribution Function of the standard normal distribution.

In the Tobit specification, $u_i \sim N(0, \sigma^2)$ and

$$\begin{aligned}EFWbased = & \zeta, & \text{if } \zeta > 0 \\ = & 0, & \text{if } \zeta \leq 0.\end{aligned}$$

In both Probit and Tobit,

- *govrev* stands for the average government non-resource revenue from 2006 and 2013
- *informal* is the data for size of informal sector from Schneider (2010) and Pinkovskiy and Sala-i-Martin (2014)
- *milsiz* is the average fraction of military personnel on total population from 2005 to 2013
- *gdpper*, *tertiary*, and *GINI* are the average GDP per capita, tertiary enrollment rate, and GINI coefficient from 2005 to 2013
- *communist* and *British* are the dummy variables for countries that have communist legal origins and British legal origins
- *wgi* and *gpi* are the World Governance Index and Global Peace Index

All of our results are preliminary. We report them here subject to later amendment and qualification. The Probit parameter estimates are in Table 5a and the marginal effects implied by these estimates are in Table 5b. A similar Probit regression but with the size of military *milsiz* and the non-resources government revenue *govrev* replaced by size of government is in Table 6. The Tobit estimate is in Table 7.

The Probit estimates of Tables 5a show a negative effect on military conscription of non-resource government revenue. It means that countries which collect more revenue would be more likely to have an all-voluntary army. Also, though the size of the informal sector is not significant, possibly due to imperfection of the data, there is still a positive effect of informal sector on military conscription. A positive effect is expected if a larger informal sector, by leading to a more distorting tax system, raises the costs of a conscription system compared to an all-voluntary recruitment system.

The legacies of the Colonial Age of the 19th century and Cold War of the 20th century still affect the world in the 21st century. Countries with British legal origins are more likely to have all-volunteer armies, while countries which still keep a Socialist legal system are more likely to have conscription. Mulligan and Shleifer (2005) explained that countries with British legal origins (common law) have higher fixed cost for conscription than countries following civil law. However, if classifying legal origins into 5 groups: British, French, German, Scandinavian and Socialist, the fraction of

countries that have conscription in the British group and German group are nearly equal (84.9% and 77.8%). Many countries following the German legal system are in Eastern Europe. Most of these former communist nations abolished conscription after 1991. Otherwise, remaining countries with Socialist legal origins all have military conscription. Cambodia are used to have all-voluntary army since 1993, since the Peace Accords, however, they have just adopted draft in 2010.

The income of people does have a significant effect on conscription. However, it is totally different from the theoretical framework. The same is true of the Gini coefficient. Inequality might not have a strong effect, but the sign on *GINI* is not negative as expected. This result may reflect the counter-effect of conscription. There are two types of inequality. The first starts with variation in ability, while the second type is fueled by discrepancy between social groups. A country with the first kind of inequality might be more likely to have an all-volunteer army because the misallocation of labor induced by a conscription system is large. However, the other kind of inequality does not have such an implication. Along with inequality of income, variation in education is another correlate of the misallocation of labor induced by a conscription system. Our preliminary estimate might suggest that the effect of education is not as strong as supposed. It might be partly because of the draft exemptions which mitigate the misallocation of labor induced by a draft. During the Vietnam War era young American men enrolled in college to be exempted from the draft.

Countries with better government institutions and better security situations seem more likely to recruit all-volunteer armies. However, the effects of these two variables are weak. It might suggest that politics and patriotism are not the main reason for adopting military conscription as commonly thought. The result also suggests that the world is more and more peaceful than ever before. The possibility for total war among countries is becoming small. Countries that still enforce conscription are motivated by economic considerations, not by military strategy.

The Probit estimate of Table 6 replaces the size of government with the size of military *milsiz*e with non-resource government revenue as percentage of GDP as the proxy for exogenous demand for a government labor force. The other independent variables are the same as in the previous estimate: tertiary enrollment rate, GINI coefficient, British legal origin, Socialist legal origin, GDP per capita, World

Governance Indicator, Global Peace Index and size of informal sector. The result in Table 5 shows the consistency of the effects of government on the choice of recruitment system. After controlling for government revenue, countries with bigger government would be more likely to enforce military conscription to fill their manpower demand.

Once again, the result shows a positive effect of tertiary enrollment on the probability that countries would have conscription, though the effect is not as strong as the size of government. The Gini coefficient now has a completely different sign than in the previous regressions in Table 5, which might suggest that the relationship between inequality and conscription is not consistent. As mentioned above, there are two types of inequality, which have different effects on the costs of a conscription system. This could be one cause of this inconsistency. Other variables, namely legal origins, GDP per capita, institutional factor and security factor, still have the same effect as shown in Table 5.

The Tobit estimates are in Table 7. The dependent variable in this estimation is the length of obligation service. Besides, countries with all-voluntary army would be scored as 0. The result shows the consistency of the non-resource government revenue, British legal origin, Socialist legal origin and GDP per capita on the length of conscription. Government collecting less revenue or having Socialist legal origins would be more likely to draft the young generation in the longer term. Besides, countries with higher income also have longer term of service for draftee, which is fit with the theoretical framework. On the other hands, countries with British legal origins would be more likely to have shorter length of conscription or all-voluntary army.

4. Conclusion

Since the Cold War ended, the world has become relatively peaceful and the possibility for a total war between countries is low, but there are still many countries which enforce military conscription. Most of them are developing countries. We have argued that within the framework of Mulligan and Shleifer (2005), developing countries would tend to have lower costs of conscription compared to voluntary recruitment than is true of developed countries. We statistically analyzed cross-country data of about 100 countries. The result from the empirical model suggests that government revenue and size of government may be the main reason for adopting military conscription.

Particularly, governments facing financial constraints are more likely to have military conscription. For them, the lower wage bill that accompanies conscription outweighs the higher fixed cost of administering and enforcing a conscription system compared to a voluntary recruitment system.

The decision to have conscription is also related to the size of the staff to be recruited. Soldiers are a part of the government workforce, fungible with other members of that workforce. Military draftees do many tasks that are not related to defense. Conscripts in Russia were used to work as miners, lumbermen, and so on and conscripts in Europe had to work as civil servants. In our empirical estimates, the size of government, and not just the size of the military, had a significant positive effect on conscription, which supports this argument.

Our results also confirm the tendency of countries with British legal origin to recruit all-volunteer armies, as noted by Shleifer and Mulligan (2005). Furthermore, we found a tendency for countries with Socialist legal origins to favor conscription. It might be explained by the smaller size of government spending in these countries. Using the simple regression of government expenditure on revenue, with 1% increasing government revenue, countries with British legal origins spend 0.55% more. This figure for countries with Socialist legal origin is 0.66%, and for other countries is 0.58%. Another possible explanation for these trends might be the lower administration cost of former or current communist regimes. Particularly, with the command and control systems and traditions from the Cold War, administration cost for conscription would not be too high in these countries. In Vietnam and China, people have to register their households with the local authorities, which note the name, address and birthday of each household member. In this case, administering and enforcing conscription would not have as high a cost as otherwise.

Finally, the result of this study also shows that quality of government institutions and the security level have little measurable effect on conscription. It might suggest that military conscription is one part of the design of a tax system, not a military or patriotic imperative.

Appendix A.1. Data sources

There are several sources from which one can construct panel data on conscription systems for about 150 countries, from 2008 to 2013. These are *CIA Factbook*, *Military Balance*, WRI (War Resisters' International) and Toronto (2005). However, only *CIA Factbook* and *Military Balance* have updated editions annually, while the other two do not reflect the change in policy of countries in the more recent years. That is a reason why *Military Balance* and *CIA Factbook* have been used, while WRI and Toronto (2005) are references to consult for past patterns. For cross-section analysis we extract the most recent observations from *Military Balance* and *CIA Factbook* and use that to code a dummy variable equal to 1 if a country is using a conscription system to actively recruit and 0 if it is using an all-volunteer system. The index related to conscription in *Economic Freedom of the World* uses the length of service obligation for measurement. Countries with all-volunteer systems are 10, and countries having conscription with less than 6 months, more than 6 months, more than 12 months and more than 18 months terms of services are 5, 3, 1, and 0.

Turning to independent variables, information for government revenue relative to GDP, and percentage of total tax revenue derived from different kinds of taxes, are collected from Prichard, Wilson, Alex Cobham and Andrew Goodall (2014). Their dataset was compiled from many sources, including IMF (*World Economic Outlook*, *Government Finance Statistics*, and Country reports), OECD, and CEPAL (Comisión Económica para América Latina y el Caribe).

Another variable that is a proxy for the difficulty in collecting taxes is the relative size of the informal sector of each country's economy. Gordon and Li (2009) use the data from Schneider (2002). Schneider et al (2010) updated the data set. In this study, the data for 2007 is used. Some countries have missing data for 2007 and so we replaced it with the most recent year that is available. Pinkovskiy and Sala-i-Martin (2014) provide a measure of aggregate economic activity of each country using satellite imagery. We use that data set with reported real GDP in purchasing power units to construct an alternate measure of the size of informal sector of each economy. We use both variables separately.

Variables related to labor force heterogeneity—a correlate of potential misallocation of labor that a conscription system would induce—include GDP per

capita and the enrollment rate for high school, collected from World Bank, *World Development Indicators* (WDI). Another variable related to heterogeneity of skills in the labor force is the GINI coefficient, which can be found in the World Income Inequality Database (WIID) (UNU-WIDER, 2015), compiled from various sources including WDI.

There are three variables for institutional factors. These are British legal origins, Socialist legal origins and World Governance Indicators (WGI). La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) provided the data for legal origins, but their data did not reflect the post-Cold-War change of East European countries, reverting to German and French legal origins as shown by Siems (2006). We incorporate the Siems changes into our variables. An indicator that can be used for measuring how the overall quality of government institutions is the World Governance Index, constructed by the World Bank. It is comprised of six components, namely Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.

The size of army in relation to the labor force is collected from WDI. But as remarked above, labor services performed by military personnel are fungible with those of other government workers. The scale of government employment and not just military personnel is for that reason an indicator of the exogenous demand for government labor that might be recruited by conscription or by voluntary enlistment. However, there are many tasks that governments outsource to private entities, maybe because of the cost efficiency of doing so. The formal number of government workers might not fully reflect the number of people that actually work for the government, and cannot fully reflect the size or composition of government employment. Another measure that can be taken into consideration for analysis is government spending. Some may argue that government expenditure might contain many components unrelated to government workers, for example, investment for facilities, or weapon purchasing. However, facilities still need manpower to build, construct, design, or produce. It is the same for weapons which require manpower to design, research, develop and produce. Overall, spending on these items might reflect the manpower needed to work for the government to provide labor inputs for the provision of public goods. Government spending might be correlated with government revenue. Another point is that government spending cannot reflect the size of government employment in state-owned

entities. That is a reason why government spending might not be systematically related to the exogenous demand for government manpower.

A measure that might fit with the model is the index for the size of government from Gwartney, Lawson and Hall (2015). This index takes into account four composition of government. Particularly, Gwartney, Lawson and Hall (2015) not only considered government consumption and transfers and subsidies as percentage of total consumption and GDP, but also included the number of state-owned companies and the tax system. Compared with government expenditure, the index from Gwartney, Lawson and Hall (2015) must be a better proxy for government manpower demand.

Finally, the measure for security, which is used in this analysis, is Global Peace Index collected from Institute for Economics and Peace.

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Table 2. Variables and Sources

Variable	Definitions	Sources
Draft	Dummy variable, 1 means conscription existing, 0 means all-volunteer army (2012)	Military Balance, CIA Factbook, WRI and Toronto (2005)
EFW	10 means all-volunteer army, 5, 3, 1 and 0 means conscription with length of service less than 6 months, 12 months, 18 months and more than 18 months (2012)	Gwartney, Lawson and Hall (2015)
EFWbased	Based EFW conscription, 0 means all-volunteer army, 10 means conscription with length of service more than 18 months. The rest would be calculated: $\frac{10 * \text{Length of service}}{18}$ *The unit for length of service is months (2012 level)	Military Balance, CIA Factbook, WRI and Toronto (2005)
Govrev	Non-resources government revenue as percentage of GDP (average, 2005-2013)	Prichard, Wilson, Alex Cobham and Andrew Goodall (2014)
informal	Size of informal sector as percentage of GDP	Schneider (2010) and Pinkovskiy and Sala-i-Martin (2014)
Milsize	The number armed force personnel as percentage of labor force (average, 2008-2013)	World Development Indicator (WB)
Tertiary	Tertiary enrollment as a percentage of the total population of the five-year-age group following on from secondary school leaving (average, 2005-2013)	UNESCO Institute for Statistics
GINI	GINI coefficient (average, 2005-2013)	World Income Inequality Database (WIID), UNU-WIDER
communist	Dummy variable, Socialist legal origin: 1, otherwise: 0	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) and Siems (2007)
British	Dummy variable, British legal origin: 1, otherwise: 0	Siems (2007)
Gdpper	GDP per capita in current USD (average, 2005-2013)	World Development Indicator (WB)
wgi	Worldwide Governance Indicator (2012 level)	Worldwide Governance Indicator (WB)
gpi	Global Peace Index (average, 2008-2013)	Institute for Economics and Peace

Table 3. Descriptive Statistics

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
draft	151	0.437	0.498	0	1
EFW	149	6.242	4.450	0	10
EFWbased	143	6.515	4.430	0	10
govrev	136	28.643	11.537	5.780	55.087
milsize	137	1.320	1.574	0.088	9.166
tertiary	135	35.269	27.394	0.609	102.546
GINI	116	38.487	7.450	26.8	64.5
communist	149	0.128	0.335	0	1
British	149	0.302	0.461	0	1
gdpper	148	13,586.200	20,031.440	198.499	102.530
wgi	149	-0.041	0.924	-2.267	1.867
gpi	133	1.995	0.415	1.218	3.423
informal ¹	127	31.964	12.495	8.5	65.8
informal ²	133	31.026	11.848	8.1	62.7

¹ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

² The size of informal sector, data from Schneider (2010)

Table 4. Correlation Matrix

Variables	draft	EFW1	length	govrev	milsize	tertiary	GINI	communist	British	gdpper	wgi	gpi	informal ³	informal ⁴
draft	1.00													
EFW1	0.98 (0.00)	1.00												
length	0.91 (0.00)	0.95 (0.00)	1.00											
govrev	-0.19 (0.03)	-0.21 (0.02)	0.26 (0.00)	1.00										
milsize	0.15 (0.07)	0.20 (0.02)	0.17 (0.05)	0.04 (0.68)	1.00									
tertiary	0.01 (0.91)	-0.01 (0.93)	-0.05 (0.55)	0.62 (0.00)	0.07 (0.44)	1.00								
GINI	0.02 (0.80)	0.03 (0.74)	0.06 (0.55)	-0.45 (0.00)	-0.09 (0.33)	-0.34 (0.00)	1.00							
communist	0.39 (0.00)	0.41 (0.00)	0.34 (0.00)	-0.06 (0.47)	0.17 (0.05)	0.09 (0.28)	-0.12 (0.22)	1.00						
British	-0.38 (0.00)	-0.38 (0.00)	-0.31 (0.00)	-0.18 (0.04)	-0.14 (0.09)	-0.21 (0.02)	0.18 (0.05)	-0.25 (0.00)	1.00					
gdpper	-0.09 (0.28)	-0.10 (0.21)	-0.20 (0.02)	0.59 (0.00)	-0.05 (0.58)	0.48 (0.00)	-0.34 (0.00)	-0.18 (0.03)	0.01 (0.89)	1.00				
wgi	-0.27 (0.00)	-0.30 (0.00)	-0.32 (0.00)	0.65 (0.00)	-0.14 (0.11)	0.60 (0.00)	-0.29 (0.00)	-0.25 (0.00)	0.09 (0.27)	0.77 (0.00)	1.00			
gpi	0.26 (0.00)	0.29 (0.00)	0.26 (0.00)	-0.58 (0.00)	0.18 (0.04)	-0.47 (0.00)	0.39 (0.00)	0.21 (0.02)	0.08 (0.35)	-0.61 (0.00)	-0.77 (0.00)	1.00		
informal ³	0.13 (0.15)	0.15 (0.10)	0.15 (0.09)	-0.50 (0.00)	-0.10 (0.28)	-0.48 (0.00)	0.31 (0.00)	0.17 (0.05)	0.01 (0.91)	-0.67 (0.00)	-0.66 (0.00)	0.58 (0.00)	1.00	
informal ⁴	0.11 (0.20)	0.13 (0.14)	0.14 (0.12)	-0.51 (0.00)	-0.08 (0.37)	-0.45 (0.00)	0.31 (0.00)	0.18 (0.04)	0.02 (0.85)	-0.68 (0.00)	-0.65 (0.00)	0.59 (0.00)	1.00 (0.00)	1.00

³ The size of informal sector, data from Schneider (2010)

⁴ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

Table 5a. The result of probit model

VARIABLES	(1) draft	(2) draft	(3) draft	(4) draft	(5) draft	(6) draft
Non-resource government revenue	-0.0393* (0.0220)			-0.0466*** (0.0179)		
Size of military	0.0873 (0.135)	0.119 (0.135)	0.0912 (0.135)	0.115 (0.113)	0.134 (0.104)	0.0470 (0.119)
Tertiary enrollment rate	0.00414 (0.00884)	0.00736 (0.00861)	0.00563 (0.00830)			-0.00161 (0.00664)
GINI coefficient	-0.00115 (0.0267)	0.0110 (0.0235)	0.00522 (0.0232)	1.40e-05 (0.0228)	0.00895 (0.0194)	0.00126 (0.0217)
British legal origins	-1.159*** (0.421)	-0.908** (0.409)	-0.968** (0.401)	-1.258*** (0.388)	-0.865** (0.356)	-1.137*** (0.382)
Socialist legal origins	1.420*** (0.545)	1.285** (0.568)	1.270** (0.556)	1.510*** (0.535)	1.356** (0.529)	1.385*** (0.537)
GDP per capita	4.30e-05** (1.81e-05)	2.35e-05* (1.40e-05)	2.22e-05 (1.36e-05)	3.27e-05** (1.27e-05)		9.80e-06 (1.01e-05)
World Governance Indicator	-0.602 (0.463)	-0.669 (0.423)	-0.691* (0.413)		-0.104 (0.245)	
Global Peace Index	0.398 (0.690)	0.431 (0.662)	0.355 (0.647)	0.819 (0.541)	0.338 (0.607)	0.999* (0.527)
Informal sector ⁵		0.00100 (0.0163)				
Informal sector ⁶			0.00134 (0.0171)			
Constant	-0.387 (1.563)	-2.071 (1.391)	-1.529 (1.358)	-0.780 (1.502)	-1.183 (1.180)	-2.116* (1.257)
Observations	96	95	100	101	108	103

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

⁵ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

⁶ The size of informal sector, data from Schneider (2010)

Table 5b. The marginal effects of probit model

VARIABLES	(1) draft	(2) draft	(3) draft	(4) draft	(5) draft	(6) draft
Non-resource government revenue	-0.0156* (0.0087)			-0.0185*** (0.0071)		
Size of military	0.0348 (0.0537)	0.0475 (0.0540)	0.0364 (0.0538)	0.0458 (0.0451)	0.0533 (0.0413)	0.0188 (0.0476)
Tertiary enrollment rate	0.0016 (0.0035)	0.0029 (0.0034)	0.0022 (0.0033)			-0.0006 (0.0026)
GINI coefficient	-0.0005 (0.0106)	0.0044 (0.0094)	0.0021 (0.0092)	5.58e-06 (0.0091)	0.0036 (0.0077)	0.0005 (0.0086)
British legal origins	-0.4138*** (0.12.5)	-0.3374** (0.1317)	-0.3601** (0.1277)	-0.4407*** (0.1058)	-0.3242*** (0.1177)	0.4092*** (0.1107)
Socialist legal origins	0.4772*** (0.1214)	0.4425*** (0.1366)	0.4315** (0.1306)	0.4984*** (0.1113)	0.4566** (0.1185)	0.4632*** (0.1178)
GDP per capita	1.71e-05** (7.22e-06)	9.38e-06* (5.57e-06)	8.84e-06 (5.41e-06)	1.3e-05* (5.06e-06)		3.91e-06 (4.04e-06)
World Governance Indicator	-0.2398 (0.1846)	-0.2665 (0.1686)	-0.2755* (0.1648)		-0.0414 (0.0976)	
Global Peace Index	0.1586 (0.2751)	0.1719 (0.2637)	0.1415 (0.2582)	0.3262 (0.2155)	0.1346 (0.2420)	0.3985* (0.2101)
Informal sector ⁷		0.0004 (0.0065)				
Informal sector ⁸			0.0005 (0.0068)			
Observations	96	95	100	101	108	103

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

⁷ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

⁸ The size of informal sector, data from Schneider (2010)

Table 6. The result of probit regression with “size of government” included

VARIABLES	(1) draft	(2) draft	(3) draft	(4) draft	(5) draft	(6) draft
Size of government (EFW)	0.321** (0.131)	0.571*** (0.160)	0.532*** (0.181)	0.529** (0.244)	0.433* (0.255)	0.458* (0.253)
Tertiary enrollment rate		0.00989* (0.00553)	0.00684 (0.00594)	0.00288 (0.00798)	0.00519 (0.00868)	0.00308 (0.00825)
GINI coefficient		-0.0143 (0.0192)	-0.00529 (0.0213)	-0.00144 (0.0238)	-0.000884 (0.0259)	-0.00754 (0.0250)
British legal origins			-0.993*** (0.343)	-1.179*** (0.402)	-1.164*** (0.427)	-1.265*** (0.417)
Socialist legal origins			0.907 (0.560)	1.029* (0.566)	1.015* (0.593)	0.980* (0.574)
GDP per capita				4.23e-05** (1.67e-05)	3.85e-05** (1.77e-05)	3.93e-05** (1.76e-05)
World Governance Indicator				-0.608 (0.439)	-0.557 (0.458)	-0.576 (0.451)
Global Peace Index				0.276 (0.633)	0.557 (0.664)	0.449 (0.647)
Informal sector ⁹					-0.00141 (0.0167)	
Informal sector ¹⁰						0.00157 (0.0173)
Constant	-2.276*** (0.851)	-3.641*** (1.192)	-3.480*** (1.239)	-4.488*** (1.677)	-4.465** (1.818)	-4.103** (1.795)
Observations	119	98	98	94	86	92

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

⁹ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

¹⁰ The size of informal sector, data from Schneider (2010)

Table 7. Tobit model

VARIABLES	(1) EFW based	(2) EFW based	(3) EFW based	(4) EFW based	(5) EFW based	(6) EFW based
Non-resource government revenue	-0.643** (0.304)			-0.790*** (0.273)	-0.652** (0.276)	-0.728** (0.308)
Size of military	2.165 (1.864)	3.491 (2.114)	3.163 (2.109)	2.701 (1.636)	2.675 (1.673)	1.880 (1.848)
Tertiary enrollment rate	0.0176 (0.116)	-0.0279 (0.116)	-0.0544 (0.115)			-0.0188 (0.113)
GINI coefficient	-0.114 (0.371)	0.135 (0.356)	0.0321 (0.357)	-0.106 (0.319)	-0.182 (0.329)	-0.247 (0.362)
British legal origins	-16.69** (6.782)	-14.32** (6.948)	-15.76** (7.021)	-16.97*** (6.291)	-15.65** (6.384)	-18.84*** (6.911)
Socialist legal origins	12.07* (6.341)	11.27 (6.929)	9.843 (6.681)	13.77** (6.322)	11.85* (6.234)	12.57* (6.414)
GDP per capita	0.000459** (0.000225)	0.000279 (0.000209)	0.000266 (0.000207)	0.000350** (0.000168)		0.000315* (0.000179)
World Governance Indicator	-7.019 (5.905)	-9.692 (6.158)	-10.31* (6.165)		2.652 (4.360)	
Global Peace Index	7.709 (9.481)	3.870 (9.644)	2.953 (9.590)	12.37 (7.735)	8.765 (9.331)	14.30* (8.318)
Informal sector ¹¹		0.0212 (0.232)				
Informal sector ¹²			0.0307 (0.244)			
Constant	0.418 (21.33)	-19.34 (19.97)	-11.18 (19.60)	-3.479 (20.75)	7.286 (20.68)	-1.084 (21.67)
Observations	96	95	100	101	101	96

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

¹¹ The size of informal sector, data from Pinkovskiy and Sala-i-Martin (2014)

¹² The size of informal sector, data from Schneider (2010)